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A SURVEY OF HUMAN PROGRESS.

LONDON: PRINTED BY W. CLOWES AND SONS, STAMFORD STREET AND CHARING CROSS.

A SURVEY

OF

HUMAN PROGRESS,

FROM THE SAVAGE STATE TO THE HIGHEST CIVILIZATION YET ATTAINED.

A PROGRESS AS LITTLE PERCEIVED BY THE MULTITUDE IN ANY AGE,
AS IS THE SLOW GROWING OF A TREE BY THE CHILDREN WHO
PLAY UNDER ITS SHADE—BUT WHICH IS LEADING TO
A NEW CONDITION OF MANKIND ON EARTH.

BY

NEIL ARNOTT, M.D., F.R.S., ETC.,
OF THE ROYAL COLLEGE OF PHYSICIANS; PHYSICIAN EXTRAORDINARY
TO THE QUEEN; MEMBER OF THE SENATE OF THE
UNIVERSITY OF LONDON; AUTHOR OF
"THE ELEMENTS OF PHYSICS,"
ETC., ETC.

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ADVERTISEMENT.

Readers peruse a book with vastly increased interest and profit if they obtain in the beginning a good general conception of the subject and its natural divisions. An ordinary Table of Contents gives considerable aid in this respect, but a continuous methodical *outline,* such as is here attempted at the fifth page, should serve both as the fittest introduction, and afterwards as a valuable means of recalling what has been learnt.

Persons in reviewing the past occurrences of their lives, are aware that some of these are much more vividly impressed on their memory than the general mass; those, namely, which afforded peculiar satisfaction or delight. Among such recollections, in minds of favourable endowment, few rank higher than the first occasions which the parties may have had of contemplating from elevated stations of view a vast population, busied in the engagements of civilized life, or merely a wide extent of the surface of this beautiful world. For instance, one cannot recall without emotion a first visit to the summit of St. Paul's Cathedral, in London, to look down from thence upon the largest city in the world; or a like visit to the hill of the Astronomical Observatory at Greenwich, from which London is seen in the distance, while nearer and below, the eye commands the broad surface of the Thames, covered with entering ships charged with the rich produce of all regions of the globe, and departing ships, carrying in return whatever the industrial skill of the empire can create. As little can persons who have had the fortune to look from Alpine heights in Europe upon surrounding kingdoms, or from still loftier summits in Asia and America, forget their astounding experience. The delight felt in such cases is often not from seeing new objects, for the individual on the dome of St. Paul's may previously have gone at leisure all over London, examining the details, but, from being able to see, within a few moments, so many objects and places displayed all in their true relations of position and magnitude. The spectator has then the full consciousness of some marvellous endowments of the human being—the bodily eye is making him present, as it were, in successive instants to localities many leagues apart, and the mental powers are storing whatever is seen or thought, in the tenacious memory. The enjoyment here referred to may not be so intense for the moment as was that of victors at Olympic games, or as that in modern communities of persons who obtain the highest honours where many rivals are striving; but in all these cases, there is involved something of narrow self, while the climber of the mountain steep has the pure satisfaction of thinking that he is but one of millions to whom similar enjoyment is offered.

This little volume is intended to afford to the reader a gratification somewhat resembling that of him who contemplates a scene of great interest from a commanding height. It aims at placing the reader mentally on a moving pinnacle from which he may view, not only a part, but the whole of man's earthly abode, and not only as things are now, but as they have been in past times, and to some extent as they are likely to be in the future. If the attempt here made to bring such matters within the grasp of ordinary minds prove less successful than the writer desires, the cause of failure will be, not in the character of the subjects, but in the deficient ability of the writer.

THE OUTLINE OR SUMMARY.

CHAPTER I.

PAST history records that the human race, unlike the lower animals whose condition has remained as unchanged since men first observed them as that of the trees among which they live, has gradually but greatly advanced from the low state called that of the savage to various degrees of civilization. This progress, still steadily advancing, has depended on the gradual increase of man's knowledge of the world around him, and of his own nature; nearly as has happened on a narrower scale to persons thrown on a desert island, who at first had difficulty to find the barest means of subsistence, but as they gradually learned what the island contained, or could by their skill and industry be made to produce, obtained both sufficient present supplies and security for the future. The progress of civilization, like other slow changes, attracts little notice from the mass of mankind, engrossed as they are with more immediate and narrower concerns of the passing day, but it is now forcing itself strongly on the attention of the leaders of society, and is interesting many other persons who have leisure to reflect.

CHAPTER II.

MEN, stimulated by their natural wants, and using their faculties of mind and body to supply these, as they must, from around them, have gradually discovered that all the things or objects in nature are but repetitions or multiplication of a few great kinds conveniently classified, as the three kingdoms, called *Animal*, *Vegetable*, and *Mineral;* and further, they have discovered that all the changes or motions incessantly going on among these objects are of but four great kinds, which they have called *Mechanical*, *Chemical*, *Vital*, and *Mental.* By study of fit types in these simple classifications, men have acquired such wide knowledge of things and their changing conditions as has enabled them to devise very numerous processes or *arts*, by which they prodigiously advance human well-being.

CHAPTER III.

As human beings have multiplied, there has arisen among them a great new art, to which all others become subservient, namely, that by which people, however numerous, are led to live together with mutual help or co-operation, as a friendly brotherhood, instead of being, like many wild beasts and savages, almost always at war among themselves. By this crowning art, called that of civilization, a country which in its original or uncultivated state could scarcely furnish the coarsest means of subsistence to a small number of savages scattered over it, is caused to produce, for at least a hundred times as many civilized people, not only unfailing abundance of the prime necessaries of life, but also innumerable comforts and conveniences, and new sources of enjoyment, of which the savage man forms no conception. This civilization advances by steps or methods intermingled, but of which the principal may be studied separately, under the following five heads:—

I. *Division of Labour* or employment, which soon leads to the invention of tools or machinery, and of means of employing in man's service the strength not only of inferior animals, but also of the inanimate forces of nature, as of wind, waterfalls, steam, &c.

II. *Commerce*, or exchanges, by which the increasing products of labour are duly distributed among the people through the intervention of markets, money, wages, &c.

III. *Population* prudently regulated.

IV. *Laws and Government* to maintain justice; which means, to give to every person security for life and property.

V. *Education* for the young (as set forth in detail in the next Chapter).

CHAPTER IV.

EDUCATION OR TRAINING.

THE lower animals, not having like men REASON to be cultivated, are guided, in obtaining their necessaries of life, almost solely by the animal instincts and propensities. Thus sheep placed in any strange land which offers common herbage will thrive and multiply. Human beings have the like animal instincts whether their faculty of reason be cultivated or not; so that children of the most ignorant savages, cast upon an island producing eatable fruits and plants, would thrive and multiply like the sheep. But to enable men to obtain necessaries and to live in safety and comfort in a civilized community formed in any degree as above described, all must be trained, to a greater or less extent, in the six departments of knowledge and conduct noted below.

I. The *language* of the country, with the modes of *counting* and *measuring* in use there.

II. The *geography* and *inhabitants* of the country.

III. The nature of *health* and the means of guarding it against the hazards of the climate, &c.

IV. The *laws* and *morality* established in the country, breaches of which bring punishment.

V. *Industrial skill* in some bodily or mental labour required in the community, and by which a livelihood may be earned.

VI. *Theology* and *religion*, or sound views as to man's origin and destiny.

Accordingly, in the study of these six particulars, part of the early life of all persons born in the country is employed—up to ten years among the poorer classes, for a longer time among the wealthy. Individuals who learn little and badly are left to act chiefly from the low propensities of the mere animal, and so continue to resemble the animal. Those who learn much and well are raised above the ill-trained more than these stand above the brutes.

The young receive their education,—

I. At home, from parents, and by intercourse with friends and with the public, all aiding the teaching of their individual experience.

II. From methodical teaching in schools, colleges, universities, churches, &c.

III. From books and the daily press.

Great errors in the business of education have hitherto prevailed in regard to—the selection of subjects of study—the order of study—the methods of teaching; but the public attention, of late, has been directed to these, and there is promise of great improvement.

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SURVEY OF HUMAN PROGRESS.

CHAPTER I.

THE FACTS OF HUMAN PROGRESS CONTRASTED WITH THE STATIONARY CONDITION OF THE LOWER ANIMALS.*

Past history records that the human race, unlike the lower animals, whose condition has remained as unchanged since men first observed them as that of the trees among which they live, has gradually but greatly advanced from the low state called that of the savage to various degrees of civilization. This progress, still rapidly advancing, has depended on the gradual increase of man's knowledge of the world around him, and of his own nature; nearly as has happened on a narrower scale to persons thrown on a desert island, who at first had difficulty to find the barest means of subsistence, but as they gradually learned what the island contained, or could, by their skill and industry be made to produce, obtained both sufficient present supplies and security for the future. The progress of civilization, like other slow changes, attracts little notice from the mass of mankind, engrossed as they are with more immediate and narrower concerns; but it is now forcing itself strongly on the attention of the leaders of society, and is interesting many other persons who have leisure to reflect.

§ 1. In comparing man with the inferior races of animals, it is seen that his vast superiority to all is due not to his bodily strength or the acuteness of particular senses, for in these respects he is surpassed by many; but to his mind, with its great power of gradually acquiring knowledge of the universe around him, and of contriving arts, founded on such knowledge, to subject events to his will. His knowledge becomes power; and a man of cultivated understanding is as much superior to an uncultivated man as the latter is to a brute.

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* The reader is particularly requested to reperuse the general OUTLINE, from page 5, at the commencement of the several divisions and chapters, that there may be constantly before the mind that clear view of the relations among the different parts of the subject, which is essential to a perfect understanding of it.

§ 2. A most striking point of difference is, that man can form and use language, whilst brutes cannot. A brute can know only what its individual experience may teach it concerning the one spot of earth on which it resides, and the one small portion of time during which it lives; but any man, through language, may learn whatever other men, in other places and times, have known or done. And after the inventions of writing and printing, which made language visible and permanent, a numerous society, or indeed the whole human race, may be regarded as forming only one vast rational being, with millions of eyes, and hands, and separate yet connected minds, all labouring for the common good, and with memory which never forgets what has once been known. This great compound being has evidently still the characteristics of youth, manifesting rapidly increasing vigour.

§ 3. A savage man cannot contend in strength with the elephant or lion, nor run with the deer, nor see in the night like the owl, nor smell like the setter dog, &c.; but the man of civilization constructs and controls, to be obedient to him, as if it were part of himself, the noble steam-engine, with force of a hundred elephants, if he so wills, to do any work; against the assailing lion or tiger he can point his fire-arms with instant effect; the deer or greyhound falls behind him as he glides along on his railway; the owl's sight is dull compared to his when aided by his telescope; and with his microscope he discovers worlds of life and activity where the sharp eye of the wren can see nothing. Then he proceeds steadily making additions to his powers.

§ 4. Such facts exhibit man as a progressive being in strong contrast with the other races of animals, which have changed as little since the beginning of human records as the trees and herbs of the thickets which give them shelter. Men, from a primitive state of naked houseless strangers in a land offering them only raw vegetables for sustenance, have gradually, by the use of their reason, attained their present high eminence. The inferior animals were created such that, within one life or generation, they should attain all the advancement of which their nature was susceptible. Some wants were at once supplied, as in the clothing of feathers to birds and of furs to quadrupeds; others were provided for by remarkable aptitude conferred on the young to learn quickly the use of their various members or organs, as in running, flying, swimming, &c.; and where more considerable mechanical skill seemed to be required, as by the bee in making its honey-cell, or by the bird in constructing its beautiful nest, there, a peculiar instinct was bestowed. Thus a crocodile which issues from an egg hatched in the warm sand, and never sees its parent, becomes as perfect and knowing as any crocodile which has lived before, or which will appear after it. How different is the story of man! He is born into the world the most helpless of living beings, and advances so slowly, that, if deserted early by his parents, he surely dies; if, even after two or three years of care, he be abandoned entirely to himself, as to a few individuals has happened who yet survived for a time in the wild woods, he grows up in some respects inferior to the nobler brutes. Then history recounts of remote times, that over large portions of the earth men lived in conditions little superior to that of brutes, as they may still be seen in Australia and elsewhere. Their condition is described as that of houseless savages, ill able to defend themselves against the wild beasts which shared the woods with them, and the inclemency of the weather, and the consequences of want and fatigue, and as being to one another often more dangerous than any wild beasts, unceasingly at war among themselves and destroying one another with every species of even cannibal cruelty: but many countries formerly in such miserable state have gradually become, through increase of man's knowledge, fertile regions, studded with noble cities, the secure abodes of myriads of civilized men.

§ 5. It aids correct thinking on this subject to compare some existing state of savage life with present advanced civilization, and to reflect that the past history of humanity on earth is chiefly a narrative of trains of events, springing from the stimulus of man's prime wants and the law of his progressive nature. Now no state of savage life on record is more brutish than that at present existing among the inhabitants of Terra del Fuego, at the southern extremity of South America.

The description given here in the "Additional Note to § 5," is extracted from the well-known Journal of the English sloop of war, the 'Beagle,' Captain Fitzroy, employed in surveying the coast in 1832. Yet the children even of such savages, if taken very young and trained among civilized people, manifest natural capacity or aptitude for cultivation little inferior to their new companions. And, on the other hand, the children of civilized parents, if thrown by disaster among savages, have been found to acquire completely the characteristics of the savage. Such facts lead to the conclusion that the differences between savages and civilized men depend mainly on the differences of their educational training.

§ 6. There are proofs still more striking of the results of deficient cultivation shown in some human beings who have been reared altogether away from human society. Students of natural history are aware that instances have occurred of cats, under the influence of strong maternal instinct, when suddenly robbed of their young, taking the young of other species, as of rabbits or hares, to nourish in lieu of their own; and of dog-mothers, under similar loss, adopting kittens. But more marvellous than this, not a few cases are recorded, on authority which has not been impugned, of she-bears and wolves, in regions where they abounded and frequently carried off children, having spared the lives of some of these, and reared them for a time among their own young. The stomach of a child digests perfectly the milk of other kinds of animals, as of the cow, ass, mare, goat, &c.; for the milk of these is often purposely substituted for that of a child's own weakly mother. In the

"Additional Note to § 6," is a statement respecting recent cases of children so stolen by wolves, extracted from the Report of a Journey of Inspection made through the province of Oude, in 1848, by order of the Governor-General of India. In the same note are extracts from historical notices of Poland, by Bernard Connor, M.D., Fellow of the Royal Society of London, who resided for a time at the court of Warsaw, touching cases of children similarly nurtured among bears, in Lithuania.

§ 7. The progress of civilization in a community attracts little attention from the unthinking multitude there. All slow changes pass nearly unnoticed by persons who are not led to make comparisons at considerable intervals. Thus the gradual wearing away of rocky coasts by the constant action of the sea waves may not be noticed until, as now, along the east coast of England, churches or other buildings of former centuries, which originally stood at a safe distance from the breakers, are seen to be near the edge of the cliff, soon, if not removed, to crumble with it. Then there is the gradual filling up of all lakes by the mud and sand carried into them by the feeding streams, and the deposit of similar material at the mouths of all great rivers, forming those broad low flats called deltas. Again, a boy does not remark from one day to the next that he has grown bigger and stronger, although he is steadily advancing to be a man; but if, on returning home after a considerable absence, he tries in vain to put on a jacket or a boot which formerly fitted him, he is struck by the remarkable change. So the individuals of an advancing community, engrossed naturally with their more immediate or private concerns, see but dimly, or not at all, the changes gradually going on in the general mass. But any reader finds in truthful history that about two thousand years ago, when Julius Cæsar landed in England, the inhabitants were in a condition almost as rude as the wild Indians of North America are now; and he may study the successive stages of advance since that time. Even at present, when the progress is more rapid than ever, few persons have their minds fully awakened to this fact, and many are surprised when made to reflect that since the birth of persons still living, such important discoveries and inventions have been made, that if any one of the number were now lost or withdrawn, the satisfaction of existence to many persons would be much lessened. Among these recent novelties, and which have sprung chiefly from British genius, are Watt's steam-engine, gas lighting, railways, steam navigation, electric telegraph, penny post, photography, &c.

§ 8. It merits attention here that the fact of progressive civilization being, under favourable circumstances, the law of human nature, was little suspected even among the thoughtful, until after the arousing occurrences of the discovery of America by Columbus, and the advances in general science subsequently made by Kepler, Copernicus, Bacon, Galileo, Newton, and others. The idea, therefore, or discovery, may be called modern. The ancient Greeks and Romans had held the opinion, that mankind had degenerated from what was called a golden age, in which there was neither vice nor misery, through descending grades to that of the iron age in which they lived. The true nature of the progress is now clearly apprehended, as is the importance of keeping the fact present to the public mind. It influences strongly the mental activity and choice of pursuits of a youth to make him aware early of what is likely to be his position in after life, because he will thereby be impelled to engage chiefly in what promises future advantage; so is it important that a community should be aware, as far as possible, of probable future changes. The opinion that the condition of a man or nation is naturally sinking, or is unsusceptible of improvement, has a strong tendency to realize the evil, as the contrary opinion, of there being an advance, is a strong encouragement to judicious perseverance.

§ 9. Schools, colleges, universities, and books are among the means which, in the progress of human improvement, have been contrived for thus cultivating the minds of individuals and of nations; and in regard to all of these there has been a progress of improvement as marked as in other things which have proceeded from the working of man's intellect. The decisions, however, as to the subjects chosen, the order of study, and other particulars, had to be based on a due consideration of the whole field of human knowledge, with its natural divisions, and the bearings of these on human welfare; and the views taken until lately were far from being complete. A simple arrangement addressed to common apprehension is here attempted.

CHAPTER II.

MAN'S DISCOVERY THAT THE OBJECTS AND PHÆNOMENA OF NATURE ARE BUT REPETITIONS OF A FEW SIMPLE TYPES—FORESIGHT AND INVENTION OF ARTS.

(Read again the whole Outline from page 5.)

Men, stimulated by their natural wants, and using their faculties of mind and body to supply these from around them, have gradually discovered that all the things or objects in nature are but repetitions or multiplication of a few kinds which they conveniently class as being of three kingdoms, called *Animal*, *Vegetable*, and *Mineral*; and further, they have discovered that all the changes or motions incessantly going on among these objects are of but four great kinds, which they have called *Mechanical*, *Chemical*, *Vital*, and *Mental*. By study of fit types in these simple classifications, men have acquired such wide knowledge of things and their changing conditions as has enabled them to devise very numerous processes or *arts*, by which they prodigiously advance human well-being.

§ 10. No features of countries are more permanent than the rivers, as the Thames, the Nile, the Ganges, and so forth; yet of the water at any time running in river channels no part was there a little while before and no part will be there a little while after. (So also the human race on earth is permanent, but the individuals composing it are in a ceaseless course of change and renewal, at the rate of about a thirtieth part every year, the new-born arriving to replace those who die.)

§ 11. Then the all-important fact is to be noted that the children, although inheriting the bodily and mental constitution of their parents, do not receive therewith the smallest portion of the knowledge which the parents possessed, but have to gather for themselves after birth, through the organs of the senses—touch, seeing, taste, smell, and hearing, often called the five gates of knowledge—the whole elementary material of their future store. Thus, when a child first gets an orange, impressions are received, (1) through the skin of the touching hand, of its size, form, and weight, (2) through the eye of its colour, (3) through the palate of its taste, (4) through the nostrils of its smell, and (5) through the ear of the sound or name which men have connected with it. These impressions being retained in the memory as a group constitute his knowledge of the orange. In the same manner the knowledge of other objects, and of progressive changes among objects, is obtained. (See Note to § 11.)

§ 12. As a burning lamp must be constantly supplied with oil to keep it alight, so human beings after birth must duly obtain four prime essentials to life, that they may live healthily for an ordinary period of about seventy years, passing through the stages of youth, maturity, and decay to death. These essentials are, *fit air*, *warmth*, *aliment*, and *rest after action*. If deprived of the first, the individual dies in a few minutes, as by drowning or other suffocation; if deprived of the second, he dies in a few hours, as when overwhelmed in a snowstorm; if deprived of the third, he dies in a few days, as when left on a bare rock after shipwreck; and if deprived of the fourth, he dies in a few days, or weeks, or months, according to other circumstances. The first indication of the child having animal sensibility is its struggle and crying when it wants a necessary, as food or warmth. It has then the feeling which it afterwards learns to call *pain*. When the want is supplied, it becomes tranquil, and it has then the feeling which it learns to call *pleasure*. In after-life to obtain pleasure and to avoid pain, near or remote, become the great motives to voluntary activity. Among the objects around the child it soon begins to distinguish those which most nearly concern it, by causing pleasure or pain; and thus the mother or nurse, the fire, the candle, become early acquaintances.

§ 13. As the growing individual afterwards has the attention directed to the apparent infinity of objects in the universe around, the mind soon makes the grand discovery that there are resemblances among them, or, rather, that the apparent infinity is only a repetition of a certain number of kinds. There are soon distinguished, for instance, the objects which in English are called dog, horse, sheep, &c., among the things living and moving about, called *animals;* the rose, myrtle, oak, &c., among things growing from the earth, called *vegetables;* and such as clay, lime, flint, gold, &c., among things taken out of the earth, called *minerals;* and the mind becoming aware that, by studying a specimen or exemplar of each kind, its limited power of memory may acquire a tolerably correct knowledge of the whole, enabling persons to obtain more easily what is useful to them, and to avoid what is hurtful, the desire for that knowledge, called curiosity, arises with the first exercise of reason./ Accordingly the pursuit of it has been unremitting, and the labour of ages has at last nearly completed an arrangement of the constituent materials of the world under the three great classes of

MINERALS (and all inanimate things),
VEGETABLES,
ANIMALS,

commonly called the three kingdoms of nature, and of which the minute description has been called NATURAL HISTORY. And museums of Natural History have been formed, which contain specimens of almost every object belonging to the classes; so that now, a student, within the bounds of a moderate space or garden, may be said to be able to review the whole of the material universe.

§ 14. It might be thought that if a man knew all the *things* or existences in the world he had nothing more to learn. But it is not so, for the things of to-day do not remain the same for to-morrow. A seed is growing to be a plant, a boy to be a man, mountains are being wasted by the action of the weather, lakes are being filled up by the solids which the feeding streams carry into them, the tides and rivers and clouds are always moving. The universe, therefore, is a scene of constant motion or change. With respect to the *changes*, however, as with respect to the *things* themselves, the second grand discovery was soon made, that there were resemblances in the multitude; and self-interest, operating in the second case as in the first, having prompted to careful classification, we are enabled in the present day, as the result of countless observations and experiments made through past time, to say that the motions or changes or phænomena (words synonymous here) of the universe, are merely repetitions or mixture of a few simple manners or kinds of motion or change, which are as constant and regular in every case as when bringing the returns of day and night and of the seasons. All these phænomena are found to be of four very distinguishable kinds or classes, which have been commonly called

PHYSICAL or Mechanical,
CHEMICAL,
VITAL or Physiological,
MENTAL or Psychological.

The simple phrases which describe the resemblances among phænomena are called *General Truths* or *Laws* of Nature, and as a body of knowledge they constitute what is called SCIENCE or PHILOSOPHY, in contradistinction to NATURAL HISTORY, already described. Now as man cannot, independently of a supernatural revelation, learn anything but what respects—either the momentary states, past or present, of himself and the objects around him—or the uniform manner in which, under like circumstances, the states have hitherto changed, (leading men to anticipate similar changes through the future,)—Natural History and Science, in the senses now explained, make up the sum of his knowledge of nature.

§ 15. As an example of a general truth or law of nature discovered, we may take the physical law of *gravitation* or *attraction*, which recalls—that every particle of matter in the universe attracts and is attracted by every other particle with a certain force varying in a known manner with the distance.—1st. It was observed that bodies in general, if raised from the earth and left unsupported, fall directly towards it, with force called their weight. 2ndly. It was seen that a ball on an inclined plane, or water on the slope of a river channel, moves to the lower part with like proportioned force. 3rdly. It had long been thought that flame, smoke, and certain vapours which when free ascend in the air, had positive *levity* as a property, the contrary of weight; but after a time it was discovered that these things also were substances having weight, but were immersed in a transparent and therefore unseen atmospheric air, which is *heavier* than they, and which therefore lifts them up as water lifts a cork or oil. Thus a *resemblance* was detected where a *difference* had long been believed to exist. 4thly. It was found that any contiguous hanging bodies are drawn towards each other so as not to hang quite perpendicularly, and that a plummet suspended near a hill is drawn towards the hill with force less than that with which it is drawn towards the earth, only as should follow from the different sizes of the hill and earth, and the different distances of the plummet from the respective centres of the two. It was thus proved that weight itself is only an instance of a mutual attraction operating among all the constituent elements of the globe; and, 5thly, the law explains, moreover, the fact of the rotundity of the globe—all the parts being drawn to a common centre; as also, 6thly, the form of dew-drops, rain-drops, globules of mercury, and of many other such things. 7thly. It was observed that all the heavenly bodies are round, as if formed of material obeying the same law. And 8thly, that these bodies, however distant, attract each other, for that the tides of our ocean rise in obedience to the attraction of the moon over them, and become *high* or *spring tides* when the moon and sun operate in the same direction. Thus the sublime truth has become evident, of which the sufficient proofs were first detected and arranged by the genius of the immortal Newton, that there is a general power of attraction, called weight where acting on earth and there maintaining a stable order among things generally, but which connects together also the distant bodies of this solar system, and probably is limited only by the bounds of the universe.

§ 16. Who but must admire that the human mind should have the power to discover in such variety and sometimes apparent clashing of facts the working of single principles, of which principles the knowledge then becomes clear foresight into futurity, enabling men to act so as to bring about important ends which they desire. Marvellous as this power appears, it is but an advanced degree of what a mere child, not yet able to speak many words, displays, when calling "polly" to a second parrot brought into its view, or "pussy" to a strange kitten, because of the resemblance perceived between the new object and a specimen or specimens already known. The law of the mind which leads to this is, as will be more fully explained in a future page, that whenever a new object or phænomenon attracts notice, there are called up in the memory ideas of the particular or particulars previously known which most resembled the novelty; and the observer is led to infer, what is true of his general experience, that where there is similarity or agreement in several points first noticed, between the new and the old, there is that agreement on the whole which constitutes a sameness of kind. A child hearing only a peculiar step or voice in a passage leading to its room will judge rightly of the person who is approaching.

§ 17. It is here evident, however, that if an individual thus judging has acquired but scanty or imperfect acquaintance with the realities or type-facts in the world around him, he must frequently be falling into error. Thus a child happening to lay his hand for the first time on a small soft muff may say "pussy," because he deems for a moment that he is touching a cat; or a child farther advanced, who is accustomed to eat wholesome berries in the garden, may during a walk across fields be tempted by other berries, and in them may eat poison. And not only do children thus err by rash judgments founded on insufficient knowledge of facts, but in early ages of the world, justly designated "the infancy or youth of the human race," when men had yet but little accurate knowledge of the things around them, individuals of the highest natural endowments have done the like. Even so late as three centuries ago, before Newton had discovered the true causes of the tides, the distinguished Danish astronomer Tycho Brahe proposed as an explanation, that the regular ebb and flow twice every twenty-four hours, so remarkable at the mouths of great rivers, was the slow respiration of this globe itself, possessing therefore a kind of animal nature or life. The great Plato also, in an earlier time, asserted, on grounds still more fanciful and feeble, that this earth was alive.

§ 18. The so-called laws of phænomena, then, being but the resemblances discoverable among the motions or changes going on in nature, it might have been expected that students of nature would first seek, by close observation and experiments, as wide and accurate an acquaintance as attainable with all kinds of individual facts. This necessity, however, was not perceived by some of the most distinguished early sages. Plato and his followers, by one rash conclusion, were led to believe that minds of strong natural sagacity or penetration could, without further study of external nature than what ordinary experience gave, extract from their own thoughts or reflections the great general truths or laws of change. Aristotle did not err so far as Plato, but he did not give sufficient warning to prevent succeeding inquirers from taking the wrong path; and although universally esteemed to have been of surpassing ability, he now shares blame as one of those whose rash, erroneous conjectures, and then whose example and influence condemned men for nearly two thousand years to a mental labour of barren speculation, as incapable of discovering valuable scientific truths as the labour of a hen sitting on lumps of chalk would be to produce chickens. The "Additional Note to § 18" is an extract from Sir John Herschel's 'Discourse on the Study of Natural Philosophy,' showing the nature of the labours of these early inquirers.

Lord Bacon, in his 'Novum Organum,' had the merit of first clearly pointing out the fallacy above referred to; and other distinguished philosophers, as Kepler, Copernicus, Galileo, Newton, &c., were about the same time exhibiting in works what he described in words. The process described by Bacon of comparing the facts or phænomena learned by observation and experiment, so as to extract from them the general circumstances or laws in which they resemble, is called the method of reasoning by *induction,* because numerous single facts are brought together for examination and comparison. The rapidity of scientific progress during the last three centuries attests the vast importance of the changes introduced about Bacon's time.

§ 19. Correct acquaintance with the laws of nature has been very slowly obtained, owing to the imperfection in early ages of men's knowledge of the mere facts of nature, and to the complexity of ordinary phænomena produced by several laws operating together under much variety of circumstances: but men have now learned enough to perceive that the universe is as simple and harmonious as it is immense, and that the Creator, instead of interposing separately or miraculously, in the common sense of the word, to produce every distinct phænomenon, has willed that all should proceed according to a few general laws. Nothing in nature is more truly miraculous than the endless and beneficent variety of results that are seen to spring from such simple elements. In times of ignorance men naturally regarded every occurrence which they did not understand, that is to say, which they could not refer to a simple law known to them, as being the result of a direct interference of supreme power, and thus for many ages, and among some nations still, eclipses, earthquakes, and many diseases, particularly those of the mind, and the winds and weather were or are accounted miraculous. Hence among heathens arose many religious ceremonies, including even human sacrifices, intended to propitiate or appease offended deities, but founded on expectations no more reasonable than if men should now pray to have the day or the year made shorter, or to have a coming eclipse averted. They had not yet risen to the sublime conception of a single Will which could say, "Let light be, and the light was," and which could give to the whole of nature permanent laws which men can discover for the direction of their conduct in life—laws so unchanging, that by them can be calculated the times of eclipses backwards and forwards for thousands of years without the error of one beat of a pendulum; and as men's knowledge of nature advances they can anticipate and explain with equal precision innumerable other events formerly deemed miraculous. Even the wind and the rain, which, in common speech, are the types of uncertainty and change, obey laws as fixed as those of the sun and moon, and already, as regards many parts of the earth, man can foretell them without fear of being deceived. He plans his voyages to suit the coming monsoon and prepares against the floods of the rainy season. Yet further, within the last few years he has discovered so much of the law of storms, that he now knows where and when his ships are likely to encounter them, and he has been able to devise precious securities against both the whirl of the hurricane and its lightnings.

§ 20. He who thus understands the laws of nature, even in the degrees in which men now know them, has such foresight of the future, and of the effects which will arise from combinations of influences which he has the power to arrange, that to a certain extent he may be said to command nature. As expressed in the language of wisdom ancient and modern, his "knowledge is power." Moreover, as all single objects and states of objects in the universe are results of antecedent agency of the laws of change, a man who first studies the laws, knows beforehand, in great part, the objects which, in examining nature, he will meet with, and thus he most remarkably diminishes the labour of studying *natural history*. He seems to learn by intuition. A well-informed man of the present day may thus be said to possess within the boundaries of his single mind the universe in miniature, where he may contemplate at leisure past events, or the present, or the future. But he has still to be on his guard, not to push his conjectures or conclusions too far. All his calculations are founded on the assumption that the course of nature, as understood by him, has not changed and will not change; and although thousands of years give countenance to this assumption, these thousands are less to a past and a coming eternity than the noonday hour which bounds an animalcule's life is to rolling ages — an animalcule which cannot, therefore, know the morning nor the evening, nor spring nor winter. Man, it is true, can foretell the change of day and of season, and the coming of remote eclipses, but the mountains of the earth are incessantly crumbling before his eyes by the action of winds and rains and other unremitting causes;

and the ocean depths which receive the fragments, are, in corresponding degrees, being filled up, and some stars which his forefathers beheld bright in the firmament are now dim or have disappeared—awful changes, of which man's present knowledge of nature's course can tell him neither the beginning nor the end.

The four classes of Scientific Facts.

§ 21. The *phænomena* or *changes* among things when reviewed by the human mind according to their resemblances, fall as naturally into the four scientific classes of PHYSICS, CHEMISTRY, LIFE, and MIND, named above, as the *things* themselves fall into the classes of natural history; and it will now further appear, that, to acquire full acquaintance with these, the mind must study the classes in the order here followed, which is that both of their mutual dependence and of their simplicity in relation to the power of human apprehension.

§ 22. (1.) PHYSICS.—The laws of physics are concerned in every phænomenon of nature in which there is sensible change of place, acting alone in the greater part of these phænomena, and modifying the remainder which originate from chemical action and from the action of life. Such physical phænomena are, the motions of bodies falling directly or rolling down slopes, of currents of water and air, of bodies carried along by such currents, of bodies thrown or projected by any force, of machines, such as water-mills, windmills, carriages on railways, of the heavenly bodies, and so forth. The great physical facts are conveniently ranged under the four words, *atoms* or material particles, *attraction*, *repulsion*, and *inertia.* It gives a striking idea of the nature and value of methodical science to be told that a person who understands aright these words, viz. how the imperishable *particles* or *atoms* of matter by mutual *attraction* approach and cling together to form masses, which are solid, liquid, or aëriform according to the quantity or strength of the *repulsion* of heat existing among them, and which, owing to their *inertia*, acquire and lose motion in exact proportion to the force of attraction or repulsion acting on them—understands the greater part of the phænomena of nature; but such is the fact. Solid bodies existing in conformity with these truths, exhibit the phænomena of *mechanics*, liquids exhibit those of *hydrostatics* and *hydraulics*, airs those of *pneumatics*, and so on, as set forth in the "Table of Knowledge" given a few pages hence.

§ 23. (2.) CHEMISTRY.—Had there been only one kind of substance or matter in the universe, the laws of Physics would have explained all the phænomena; but there are *iron*, *sulphur*, *charcoal*, *oxygen*, and above fifty others, which, to the present state of science, appear essentially distinct. These, when taken singly, obey the laws of physics, but when two or more are placed in contact under certain circumstances, they exhibit a new order of phænomena. Iron and sulphur, for instance, brought together and heated, disappear as individuals, and unite into a yellow mass called pyrites, resembling gold in look, and in most of its properties unlike to either of the constituents: under other new circumstances the two substances will again separate and assume their original forms. Thus, as the few simple sounds or letters of a general alphabet can be put together to express all the words in all languages, so do the few chemical elements combine to form all the bodies in nature, inanimate or living. It is to be remarked, however, that during chemical changes the substances are not withdrawn from the influence of the physical laws, for no substance ever loses its weight or inertia. Chemical states and motions may therefore be regarded as modifications of physical states and motions; and many chemical changes are merely beginnings of physical changes, as when the altered chemical arrangements of particles in ignited gunpowder produce the physical explosion. Then nearly all the manipulations of chemistry, as weighing, measuring, transferring gases from vessel to vessel, are directed by physics alone. Chemistry thus cannot, to any considerable extent, be understood or practised by a person who is ignorant of physics.

§ 24. (3.) LIFE.—The most complicated state in which matter exists is where, under the influence of life, it forms bodies with a curious internal structure of tubes and cavities in which fluids are ever moving. These are called organized bodies, because of the many distinct parts or organs which they contain, and they form two distinct classes, the individuals of one of which are fixed to the soil, and are called *Vegetables*, and of the other are endowed with certain powers of locomotion, and are called *Animals*. The phænomena of growth, decay, reproduction, death, sensation, self-motion, and others belong to life; but from occurring in material structures which subsist in obedience to laws of physics and chemistry the life may truly be regarded as something based on the other two, and cannot be studied independently of them. The greater part of the actions going on in a living body are, in truth, chemical and physical phænomena. The phænomena of life, from involving the agency of all the sets of laws, are the most complex of any. The science of life, scientifically called *physiology*, has the two divisions of animal and vegetable physiology.

§ 25. (4.) MIND.—The most important part of all science is the knowledge which man has obtained of the laws governing the operations of his own mind. This department stands eminently distinct from the others on several accounts. Unlike that of *organic life*, which could be little understood until physics and chemistry had been previously investigated, this made great advances in early time, when the others, as formal sciences, had scarcely begun to exist. The unsurpassed literature of ancient Greece and Rome bears clear evidence of this. The study of laws of mind according to the true mode of research, namely by *induction*, was delayed because of the impression existing, that to admit the possibility of fixed laws of mental action was almost to allow that there is not human free will and responsibility; but closer examination shows this to be a misconception. No one denies, for instance, that there is a law of memory which compels a learner to read or to hear several times any verbal composition, which is afterwards to be repeated without book—and there are similar laws with respect to the other faculties. (See Note to § 117.)

It is to be remarked here that laws of mind which man can discover by his reason are not laws of independent mind, but of mind in connection with body and influenced by bodily condition. Mind connected with body can acquire knowledge only slowly through the bodily organs of sense, as stated in § 11, and more or less perfectly, according as these organs and the central brain are perfect; and even after knowledge has existed, the mind will forget, confound, and draw insane conclusions, if the brain suffer some considerable injury. A fever or a blow on the head may instantly change the most gifted individual into a maniac; and a large proportion of the cases of madness and eccentricity can now be traced to a morbid state of some part of the brain. An originally misshapen or defective brain causes idiocy for life; and childhood, maturity, dotage, which have such differences of bodily states and powers, show corresponding differences of mental faculty. When a child, although with perfect brain, has had from birth one or more of the inlets of knowledge closed or otherwise rendered useless, the mental state is found to have corresponding deficiency. Thus in the case related by Dugald Stewart in his 'Philosophy of Mind,' of the son of a Scottish clergyman, born both blind and deaf, and therefore remaining dumb, although there was evidence that the sufferer possessed usual mental capacity or power of reason to use whatever information could reach him, the mind remained nearly a blank. It was not possible to make him comprehend that he had been born, and that he had to die; that he had parents; that there was a sun and stars;

and he could have no conception of a Creator or of a future life.

MENTAL PROCESSES.

§ 26. The principal mental processes showing conformity to established order or laws are as follows, and the names by which they are distinguished are placed in the margin of the page. They all range under the two heads of the UNDERSTANDING, or Intellect, and the WILL.

THE UNDERSTANDING OR REASON.

(1.) Impressions are made by external things, and by changes among things, on the brain and mind, through the organs of sense, as stated in § 11 and in Note to § 26.	SENSATION.
(2.) Such sensations leave permanent copies, called Ideas, in the memory, which are reproducible at any future time, in the absence of the original causes. This occurs somewhat as photographic images are left by the momentary action of the sun's light.	IDEA. MEMORY.
(3.) Ideas hang together in the mind, or are there associated, in the order in which they first occurred, or as they are afterwards arranged by the mind itself, according to their relations of resemblance, &c., as is described in § 16; and any idea, however awakened, can then suggest or call up any other ideas associated with it in related groups or trains of sequence.	ASSOCIATION.

(4.) Any present mental experience of sensations from new objects or phænomena recalls the particulars of former experience most nearly resembling them (§ 16), and there is a mental measuring or judgment of the resembłances and differences, and a consequent classification. Thus advances man's knowledge of natural things and of the course of change among them, as set forth in the "Table of Knowledge," § 30.

COMPARISON.
CLASSIFICATION.
KNOWLEDGE.
JUDGMENT.

(5.) It is found convenient, and greatly aids the memory, to connect sounds or names, not only with the ideas of individual objects and changes, but also with those of the classes of both kinds, mentally formed. The words quadruped, bird, fish, &c., are names of classes of things; the words fall, walk, gallop, recall classes of phænomena.

NAMES.
LANGUAGE.

(6.) To be able to make accurate comparisons of resemblances and differences, and thereby correct classification, the observer must have simple standards of comparison. In all countries the human body itself, and its parts, have served as such standards. The "*ten*" fingers have been the basis of counting, and the lengths of the "foot," cubit, step, fathom, &c. have served as units of dimension. (See page 92, § 74 B.)

COUNTING.
MEASURING.

(7.) When in using language, oral or written, to store or to communicate knowledge, the words are so chosen and connected as to describe intelligibly to a learner some thing or fact as it is, or has been in nature, the statement or expression is called true: when this is not the case, the statement is called erroneous or false. Most of the vain disputes that occur among honest men have arisen from their using some of the words or names with different meanings. An art which directs and tests the right use of names is called *Logic*. (See Note to § 26-7.)

TRUTH.
ERROR.
LOGIC.

THE WILL OR VOLITION.

(8.) Most strong sensations awaken feelings either of pleasure or pain. To obtain the first of these, and to avoid the second, is the aim of the whole of human conduct. The idea of a pleasure which may be obtained is accompanied by a feeling called *desire*, and the idea of a pain which may come produces a feeling called *aversion*. Different degrees of these feelings are named *affections*, *emotions*, *passions*. They excite voluntary muscular actions to bring about the desired results.

AFFECTIONS.
EMOTIONS.
PASSIONS.
VOLITION.

ARTS.

§ 27. The mental powers which enable a man to acquire knowledge of things, and to discover a certain order or course in the past changes of nature, to recognize the same order in the present, and to anticipate it in the future—in other words, which enable him to learn *natural history* and *science*—would still have left him as but a dreamer on earth, or a mere looker-on, had he not possessed a body susceptible of pleasure and pain, and those bodily powers which allow him to a certain extent to mix himself up with passing events so as to turn them to his advantage. When he does so use his powers, he is said to exercise an *art*—as when he plants an acorn which will soon become an oak, or when he scatters on prepared ground a measure of seed-corn assured that the harvest will give it back, perhaps a hundredfold. It is important here to remark, that while originally acquiring his knowledge of the course of nature, man is connecting in his mind ideas of groups or chains, in the order in which nature herself presents them to him: but for the purposes of *art*, he has to acquire the facility of reading such lessons backwards too; for in every case he has to keep present to his mind, as one link of various chains of sequence, the object or end sought by his *art*, and then he has to look backwards from it along all the chains of events known to him which lead to it, that he may choose among them that one in which his bodily powers may, with the least trouble to him, become an introducing or determining link.

§ 28. On the knowledge of things and laws of change sketched in this chapter, all the arts of man are founded; some of them chiefly on the single part of *physics*, as that of the machinist, architect, mariner, carpenter, &c.; some chiefly on *chemistry* (which includes physics), as that of the miner, brewer, dyer, glass-maker, &c.; and some chiefly on physiology (which includes chemistry and physics), as that of the scientific gardener or botanist, the agriculturist, the zoologist, &c. The business of teachers of all kinds, and of magistrates, legislators, advocates, &c., may respect any other departments, but must necessarily depend on the science of mind. The art of medicine in its full range, comprehending what regards mind as well as body, rests on all the four departments nearly in an equal degree.

METHOD.

§ 29. The substance of this chapter may be thrown into a tabular form, to be viewed at a glance, as shown in page 48, and that table or map, while serving its special purpose, may teach by example the importance of orderly METHOD, equally in acquiring, preserving, and communicating knowledge. The mind cannot have clearly present to its consciousness more than one object at a time, although perceiving dimly many other objects around connected with that one—just as the eye directed to a printed page sees distinctly but the one word or even one letter, to which the central line or axis of the eye is at the moment pointed, and other letters and words only enough to indicate their mutual bearings. And as the eye, to read a page, must be directed to all the words in succession, so the mind, to examine or review a complex subject, must have every part brought under notice in some natural order or succession. The most common and useful plan or method is to consider any object as being made up of parts which have to be studied one after another. A person examining the map of a kingdom is guided by common sense, first to run his eye over the great outline or boundary, then similarly to scan other lines which mark the important divisions formed by mountain chains, rivers, &c., then to note positions of great cities, and in due succession to examine the smaller objects. Again, a traveller having to recollect or to describe an interesting island visited, naturally attends, 1st, to any other islands or remarkable objects around it which mark its place; 2ndly, to its magnitude and general form; 3rdly, to its substance, as being granite, limestone, chalk, &c., alone, or with mixtures; 4thly, to the chief plants and animals found scattered upon its surface; 5thly, to the people living on it,—thus passing step by step from the greater to the succeeding particulars. And such essentially, substituting the word *world* for *island*, is the order in which it is easy and useful to contemplate the great universe itself. In the first column of the table, its methodical divisions are indicated, (1) the host of heavenly bodies, *astronomy;* (2) the globe of our earth, which is the one body of the mass which men can approach to study minutely, *geography;* (3) the mineral masses of the earth, *mineralogy;* (4) the living things, vegetables and lower animals, *plants* and *animals;*

(5) the master of the whole—man, *man* and *mind.* In the *second* column of the table are noted the four great sciences or sets of laws, in the order of the division of things placed in the first column, whose phænomena they severally explain. In the *third* column are noted the chief arts which men have devised for controlling nature to serve their purposes.

§ 30. *Table or Map of Human Knowledge.*

THINGS or Objects, called Natural History.	PHÆNOMENA or Changes, called Science or Philosophy.	ARTS or Devices, called Practical Applications.
1. Astronomy :— The Celestial Bodies.	1. Physics or Natural Philosophy : Mechanics, Heat, Electricity, Magnetism, Optics, Light, Astronomy, &c.	Mechanical :— Architecture, Engineering, Navigation, Manufactures, &c.
2. Geography :— The Earth itself.		
3. Mineralogy :— Mineral and other inanimate things. Geological Facts.	2. Chemistry :— Elementary Substances, and their Combinations, &c.	Chemical :— Mining, Brewing, Dyeing, Manufactures, &c.
4. Living Things :— Botany. —Vegetables. Zoology. — Animals. Man's bodily nature.	3. Biology or Physiology :— Vegetable Physiology, Animal Physiology.	Physiological :— Agriculture, Horticulture, Hygiène, Medicine, Rearing of Animals.
5. Man and his Mind :— History ; Facts of Civilization.	4. Mental Science or Psychology : The Intellect, The Will, Moral Philosophy, Political Economy Theology.	Mental :— Language, Logic, Mathematics, Method, Art of, Morals, Government, Fine Arts, Education, &c.

CHAPTER III.

GRADUAL INCREASE OF HUMAN WELL-BEING PRODUCED BY ADVANCE OF THE ART OF CIVILIZATION, OR LIVING TOGETHER WITH MUTUAL HELP AND PROTECTION.

(Read again the whole Outline from page 5.)

As human beings have multiplied, there has arisen among them a great new art, to which all others become subservient or tributary, namely, that by which people, however numerous, may live together with mutual help or co-operation, as a friendly brotherhood, instead of being like so many wild beasts and savages, almost always at war among themselves. By this crowning art, called that of civilization, a country which in its original or uncultivated state could scarcely furnish the coarsest means of subsistence to a small number of savages scattered over it, is caused to produce, for more than a hundred times as many civilized people, not only unfailing abundance of the prime necessaries of life, but also innumerable comforts and conveniences, and new sources of enjoyment, of which the savage man forms no conception. This civilization advances by steps or methods influencing conjointly, but of which the principal may be studied separately, under the following five heads:—

I. *Division of Labour* or employment, which leads soon to the invention of tools or machinery, and of means of employing in man's service the strength not only of inferior animals, but of the inanimate forces of nature, as of wind, waterfalls, steam, &c.

II. *Commerce*, or exchanges, by which the increasing products of labour are duly distributed among the people through the intervention of markets, money, wages, &c.

III. *Population* prudently regulated.

IV. *Laws and Government* to maintain justice; that is, to give to every person security for life and property.

V. *Education* for the young, as detailed in Chapter IV.

§ 31. The table in § 30 exhibits the whole mass of knowledge which men in past time and in all countries have been able to accumulate, and on the amount of which, applied to use in different countries, depend the different degrees of civilization in these countries. Of this mass, however, a single mind can receive only a limited part, yet always enough to fit the individual to perform aright the duties of some station in society. It is not necessary that every sailor in a ship should know the business of the carpenter, blacksmith, cook, engineer, captain, and others, and still less is it necessary that every member of a great civilized community to which the ship belongs should understand the details of the vastly more numerous occupations practised there.

§ 32. When a huge ship has to be equipped for sea, there is an appointed director or person in authority who can readily select from the mass of the people, individuals fitted by their previous education or training for the various offices on board; but for a great community or nation containing millions of persons who have all at birth very similar capacity or natural endowments, there is no such visible director to decide what studies or labour each individual shall pursue, that there may be provided all the diversity of ability and character ultimately required for the purposes of the society; yet has the Divine wisdom which devised all, so willed, that each person, in growing up and choosing that career, which, under the circumstances, promises to be most for the individual advantage, shall generally choose that which is also beneficial to the community. We have now to explain how this admirable result is brought about.

§ 33. First, it is to be recalled, as stated in § 12, that man, like other warm-blooded animals, must always have the four prime essentials to life—*fit air, warmth, aliment,* and *rest after action;* and that to obtain the pleasure from using, and to escape the pain from wanting these, are the chief motives to his voluntary activity. Then it is true, that in his bodily constitution, man has a very close resemblance to the higher classes of the inferior animals, such as the lion, wolf, dog, &c., which, like him, eat the flesh of other animals for sustenance. The bodies of all have similar framework of bone and muscle, and their numerous organs, although differently proportioned, are identical in kind and function. There are limbs for motion and for seizing the food; organs of digestion to act on the food after the mouth and teeth have partly prepared it; a heart and blood-vessels to distribute the nourishment; an external covering of skin; then there are similar organs of sense—eyes, ears, nose, palate; all kinds have the states of sleeping and being awake; and of birth, growth, maturity, and decay; they reproduce their like, and after a fixed term they die. Thus far the wondrous resemblance holds.

§ 34. But the momentous contrast then presents itself, between the stationary animal and the progressive being. The lower animal is shortsightedly or almost blindly selfish, seizing whatever may satisfy its wants and appetites without the least regard to the suffering it may occasion to others, or to many other probable consequences, as when a tiger, without sign of hesitation or remorse, will tear a human mother and her babe to satisfy its hunger for the moment.

Man, on the other hand, in his animal body has the intelligent soul or mind, of unmeasured capacity for good, and of sublime aspirations in regard to the future. His mind can discover the order or course of nature, of which the knowledge is called Science; and, by then foreseeing, from what has occurred in past time, that which may occur in the future, he perceives that if, instead of fighting for necessaries with others of his own race, as brutes and savages do, he form friendly alliances with them, that is to say, alliances governed by justice and benevolence, he may secure for himself not only unfailing abundance of the prime necessaries of life, but innumerable other means of happiness altogether unknown to rude societies. By following such course of action, the shortest expression for which is the divine precept, "Do to others as you would that they should do unto you," man has gradually established on earth highly advanced, peaceful, or civilized communities.

§ 35. Man has been described as a double being, having two natures dwelling together, but which often pull in opposite ways. French writers have spoken of these as *l'âme et la bête*, the *soul* and the *beast*. The mere animal nature would yield to the impulses of the moment; the far-seeing reasoning nature calculates remote consequences, and can plan very complex arrangements to bring about desirable ends. If the mind of a human being be left quite uncultivated, only the animal propensities and instincts appear in the conduct (see the Note to § 5, regarding the inhabitants of Terra del Fuego, and to § 35).—The reflection may occur here, that some of the inferior animals, as bees, ants, beavers, and others, live in a kind of co-operative association directed by their instincts, which closely mimic reason; but although the facts are marvellous, they fall short of advanced human arrangements more than the most perfect bird's nest fails in comparison with the mansion of an opulent proprietor in a civilized community, stored with the precious products of all climates, and having libraries, museums, philosophical apparatus, and so forth.—We now proceed to treat of the steps by which human civilization has advanced.

§ 36. *Division of Labour.*—In a peaceful community, of which a numerous private family is a fit type, the different kinds of labour required would naturally fall to the members who by strength, age, sex, peculiar ability, or otherwise, were the fittest for them, and would remain with these or with others trained by these through the future. In the mean time, persons having their attention confined to particular kinds of labour would be likely to devise shorter methods of effecting the ends in view, by new tools or processes, and by new divisions of complex labour into distinct portions. In the course of such changes it is discovered that in producing a single article of manufacture,[*] if the different parts or steps of the process be undertaken by different individuals, so much time is saved to the worker from not having to change from one place or process to another, and so much greater dexterity is acquired in all departments, that, for every co-operating workman employed, many times more produce comes at last than if every man had laboured apart, executing all portions of the work himself. The prodigious increase of produce from industry, however, comes from the invention of machinery, which enables men to obtain help not only from some of the inferior animals, as horses, oxen, camels, &c.—but also from the great inanimate forces of nature in waterfalls, wind, steam, &c. It is because the labour of a whole civilized community is thus subdivided, but joined by skilful co-operation, and aided, that such marvellous abundance and cheapness of all things necessary or convenient are produced; and that a journeyman worker, who had received no other property from his parents but health and some education, if he be industrious and prudent, can command necessaries and desirable things far beyond the reach of chiefs among rude men. Any child born into a civilized and well-governed community, if he be well trained, is a young heir come to enjoy a rich inheritance.—It is readily perceived that, in a society so advancing, there would soon arise great differences among the members in regard to property or wealth, for the labour of the more able and industrious would be more productive than that of others; and, if economy in expenditure were observed, there would be rapid accumulation, which would afterwards naturally pass to children or connections.

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[*] See "Additional Note to § 36."

COMMERCE, BARTER, OR EXCHANGE.

§ 37. The marvellously increased produce of human industry, shown above to proceed from division of labour and invention of machinery, could not have been obtained, if men had not at the same time been able to devise means, progressively more and more convenient, of exchanging quantities of one commodity for equivalent quantities of others. A skilful mechanic, for instance, producing any of the common necessaries, could not confine himself to the species of labour in which he excelled, unless he could exchange easily what of his work was not needed in his own family, for portions of the bread, meat, clothing, and other necessaries, as skilfully produced by other workers, who had, similarly, excess of their goods to barter away. To facilitate this mutual barter or exchange several things were required, as now to be noted.

§ 38. A *market*—or place where producers, with their wares, might meet and bargain. In early times, meetings for exchanges, or sale and purchase, were held generally in appointed places and at appointed times, which places and times were called markets and market days. When such places afterwards grew into towns, as naturally often happened, the name might be retained, as Newmarket is in England; but gradually every town became a permanent market, in which stores of commodities were always on sale. Hence people would have to speak of the London market, the Hamburg and Bordeaux markets, then of the English, German, French markets, and, at last, of the European, Asiatic, and American markets.

§ 39. *A medium of exchange* (ultimately called *money*).—This signifies a means of estimating the comparative barter-worth of different objects. One measure of the kind naturally occurring to everybody would be the ascertained amount of labour expended in preparing and bringing to market the various articles; for evidently a man who had expended a day, or any certain time, in collecting shell-fish on the sea-coast, would deem these a fair equivalent for the quantity of anything else which another person had obtained, or he himself could obtain, in the same time. The object would always be to apply the test of the labour consumed as the test of worth. It would much simplify this process if some one article were taken—corn, for instance—always in the market, wanted by everybody, the average cost of which in labour were fairly ascertained, and which was readily divisible into any quantities—that article could be used as a common standard of reference. The quantity of corn which could be gotten or would be given for a known quantity of any other thing would thus be a price, expressed in corn, of that other thing. Now, corn has been employed in many parts of the world as such a standard. Sheep, cattle, and other common things have been used similarly. At last all over the world, the metals, gold, silver, and copper, have been found the most convenient standards. Being of little bulk they are easily carried about; they are not perishable by keeping, readily divisible into portions of any magnitude, which portions can receive any desired form as coins or money, and can be stamped by public authority to give assurance of their purity. The market value of these metals, called, from their great worth in small bulk, the precious metals, is decided, as that of every other thing, by the amount of labour expended in collecting given quantities of them. Such money, therefore, is really a token or index of the labour expended in getting it, as truly as it becomes afterwards that of the labour-cost of anything bought or sold through money as a medium. The money value is called the price. In extensive transactions, to make payments in metallic money would be laborious and attended with some risks; but modern skill has contrived to substitute what is called paper-money, in the form of bank-notes, bills of exchange, bonds, &c., which serve as well for the present, being all converted after a given time, through the agencies of bankers and others, into metallic money or other equivalents, of the amounts written on the documents.

§ 40. *Supply and Demand.*—It would soon be observed that the market prices of various commodities would fluctuate, within moderate limits, above and below the usual or average rates, according to certain circumstances. Thus while the supply of corn were just sufficient for the community, and the natural demand, therefore, were as usual, the average market prices would be maintained. But if, after a bad harvest, the supply were less than usual, all the expectant buyers could not be satisfied, and those likely to be disappointed would offer a higher price rather than go without their purchase. This competition would immediately cause the market price generally to rise, in some proportion, to the deficiency. On the other hand, a superabundant harvest would send more corn to market than would be taken at usual prices; and the dealers, rather than carry home again what was in excess, would offer to sell at a price below the average rate, and would thereby reduce the price to all in proportion to the excess. The like fluctuations would happen in regard to all other things brought to market, when, from any cause, the usual supply or demand were changed. The changed market prices at any time, compared with the average usual prices, would thus become a precious indication of the public needs and the existing provision to supply them, and would direct the attention of producers and dealers to the kinds of activity which would be likely best to pay them and best to serve the community.

§ 41. *Wealth in its various forms.*—The wealth or property of a country which has long been prospering does not consist, as shallow knowledge supposes, in the quantity of money among the people, but in the many enduring results or produce of the judicious labour which, in past time, had been employed for the numerous useful purposes of the community; as in cultivating the land, constructing houses, making roads, bridges, canals, ships, machinery of all kinds, in gathering stores of food, clothing, and other necessaries for future use. The money existing there serves chiefly as a medium of exchange or trading, and in comparison with the other substantial forms of wealth in the country is as inconsiderable as is the oil which lubricates the rubbing parts of a great machine to the machine itself.

§ 41 B. *Wealth, Wages, Rent, Interest, Profit.*—The important truth is here to be noted, that the whole wealth of a country is the property, not of the general mass of inhabitants, equally, but chiefly of the descendants of the individuals or families whose skill, industry, and economy, acting through past time, had produced it. It is further to be remarked, that the greater part of such wealth is of value only when put to use, for a fishing-net, a corn-mill, or a farm, has no value while lying idle, and soon falls into decay. The proprietor of any of these things may or may not be able himself to act as the fisherman, or miller, or farmer; but he may at any time employ or hire some of the class of persons, everywhere abounding, whose parents not having been frugal, had no property to give or to bequeath them, but left them to earn a livelihood by rendering productive the property or machinery of other persons, willing to pay for their labour. Such payment of a proprietor to a worker is called *Wages.* Again, if the proprietor let or lend his mill or farm for so much by the year or other period to a worker, then called a tenant, to be used by the tenant as he deems best, such fixed sum as payment is called *Rent.* Or if the proprietor, having sold his mill or farm for money, or having free money from whatever source, chooses to lend that money to another for a certain per centage per annum (four or five per cent. is a common rate), to be used by the other to purchase machinery or to trade, such per centage is called *Interest* of the loan. And what a borrower gains above the interest paid by using such money is called his *Profit*.

§ 42. Now the rates of these four things, *Wages*, *Rent*, *Interest*, and *Profit* depend, like the price of anything else in the market, on the relation between supply and demand. Wages, for instance, depend on the proportion between the number of persons seeking to gain a livelihood by their service or labour in connection with the property of others, and the quantity of such property, stock, or capital in the country, which, to be useful, requires their service; and so, of the other three things mentioned. It is interesting further to observe how many other things are decided by the state of the market. The amount of wages obtainable may decide—the choice of a profession; whether a man can prudently marry or should remain single; whether a person shall emigrate or not; and so forth. The market influencing thus extensively, has often been regarded as the finger of the Divine Ruler, pointing out, in intricate cases, what conduct men should pursue, to secure their greatest good.

POPULATION REGULATED.

§ 43. *Population prudently regulated.*—Such a happy condition of things, as above described, might be permanent if the number of persons in a well-peopled country remained nearly the same, and the corn-fields, fisheries, and other sources, furnished, year by year, all the food required for the inhabitants. But the very important truth is to be noticed that the population tends ever to increase, while the fields do not grow larger, and thus times of scarcity will occur. All living things, vegetable and animal, have the marvellous power of reproduction, differing in activity for different kinds. Some kinds of corn increase a hundredfold from a single seed every year. Of tame animals, rabbits and pigs may multiply tenfold in a year; a flock of sheep will double its number in two years; horses and oxen less quickly; and man, whose animal nature obeys a similar law, if he be in a society commanding abundance of food, as in the new colonies of America for instance, doubles his number in about twenty-five years.* Any one species, therefore, if necessary room and sustenance were given, could alone cover the whole earth in a few years. That no species does so is owing to the facts that they all are rivals and competitors for space and food, and that every kind is the natural food of some others. These and other circumstances, as of climate, &c., determine the distribution and proportions of different living beings on earth. Man can defend himself against his natural enemies the lion and tiger, but he cannot live without food. He learns to avoid threatened scarcity, in part by increasing industry and skill, but chiefly by his intelligent foresight or prudence, which makes him delay or avoid marriage until he sees that he will have the means of supporting a family. In cases, however, where little knowledge and prudence exist, as among the poorer and uneducated classes of most communities, the race generally multiplies to redundancy, and, after scanty harvests, has to be cut down again by diseases arising from want, or even by direct famine, to the level of the ordinary food-supply. This state of things, even in advanced states of civilization, leads to many outbreaks among the people of the low animal selfishness described above, in the forms of crimes against property and person, in thefts, robbery, murder, and others. To prevent such occurrences, the members of societies everywhere have been forced very early to make laws and establish magistrates or government for the maintenance of justice and order in all their forms. Societies thus become very complicated, with great differences of employment and rank, and in the competition and rivalry of individuals seeking to obtain more than a due share of power and wealth, contentions, even to bloodshed, spring up. In some countries, out of these despotism has arisen, in others democracy, in others anarchy for a time. And in some countries, as now in England, a state of balanced authority has been established, where men deemed wise and good are chosen by the people to represent them in the great national council, which shares the labours of the Crown in duties of legislation and government. In such a state there may be great security and enjoyment for the mass of the people. (See Note to § 43.)

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* See "Additional Note to § 114."

§ 44. It is here to be remarked, that men, in exerting themselves to obtain the prime necessaries of life, do not, like the lower animals, think only of the supply for the present day, but being aware, through the great power of human foresight, that the possession of certain means, such as wealth, authority, station, and so forth, will secure to them an unfailing supply of the necessaries through the future, they are seen generally to be pursuing rather means of future good than present ends. And the explanation given in § 39, of how *money* becomes the measure and representative of everything else which has market value, seeming to give command over all the good things in the world, and to be a cure for almost all the evils, explains also why money in the various forms of wages, pay, profits, fees, salaries, stipends, &c., acts as the grand spur to activity throughout society. It explains, lastly, why many persons, in their eagerness to get money, seem to forget what justice allows.

GOVERNMENT AND LAWS.

§ 45. Among brute creatures, as set forth in § 34, *might* acts as *right*, and rival pretensions are settled by force which often becomes a fight even to the death. Among human beings government and laws are devised for the purpose of giving to every member of the community protection for life and property against any aggression. In a single family the authority of the father answers this purpose; but as communities enlarge the ends can be attained only by the appointment of magistrates and laws. Without such devices men could never rise from the savage state, and if, in any country, laws after existing for a time cease to be, there is relapse into the savage state. It is evident that if a man had always to tremble lest assassins and robbers should break into his dwelling to seize anything there worth taking away, and to kill him if he resisted, he never would labour to make or collect objects which might tempt them, therefore the tools, machinery, and stores of civilization would not come into existence. And again, if, after a community under favourable circumstances had amassed some useful property or wealth, a bad government or anarchy were to supervene, allowing robbers and murderers to escape with impunity, the condition of the people would soon sink back to that of the savage.

§ 46. In countries where Government, by laws and punishments, has advanced sufficiently to prevent almost entirely the fiercer outbreaks of animal selfishness, such as robberies and murders, there are still very numerous ways and forms in which dishonest ingenuity works very actively, and tries to work concealed. Some of these forms have the names of fraud, outwitting, swindling, lying, breaking promises; of imposture, as in connection with medicine, or with pretended sciences like alchemy and astrology; or with false religions, such as of old existed among the Egyptians, Greeks, Romans, and others; then individuals appear, who for their private ends, although under pretext of labouring for the public good, contrive, with others, to establish hurtful monopolies and unjust privileges; lastly, the number has not been small of ambitious men who have succeeded in obtaining for themselves supreme rule or despotic sway over the communities of which they were members, which sway they have afterwards used to the detriment of all. The two gigantic forms of injustice perpetrated among men are civil and religious despotism. They constitute between the rulers and the people the relation of tyrant and slaves. Civil despotism, for instance, may be viewed in the Asiatic kingdom of Siam, where the usage is that no subject shall approach the person of the monarch but in the crawling postures of a worm, with the face and body against the floor. Religious despotism shone out in the laws of the Vedas among the Brahmins, which ordered that any person speaking ill of a priest should have his tongue cut out, and that any person who listened to such speech, and did not denounce the offender, should have boiling oil poured into his ears. When the two despotisms are joined, which has very often been the case, the fact is deplorable indeed.

§ 47. The remedy for many of the evils above referred to is to have a system of laws established which shall control the conduct of kings or other persons intrusted with public authority, as strictly as of the people generally; and such laws can come only from the deliberation in concert of intelligent and good men fully acquainted with the various interests of the society, and selected for their fitness from the mass of the people by free public choice. The difficulty, however, of establishing and maintaining in efficiency such a deliberative assembly is extreme; and although great progress has been made, particularly in England, it has not yet been completely overcome in any part of the world. The chief impediments are, that the education of the people generally, in regard to such matters, remains so imperfect that only a small proportion know the true nature and importance of government. And there is the tendency in the imperfectly educated lower classes of almost all populations to deem the form of government and of religion under which they happen to live as much a part of nature, and as little to be altered by human interference, as the rising of the sun and the course of the seasons. Then all the deliberate culprits described in § 46 have an evil interest in preventing good government, because it would restrain them. And lastly, there is in very many minds a degree of self-esteem and self-preference which occasions difficulties in the selection of individuals to be intrusted with the management of public affairs. Some of the forms of this self-regard are noted in the following sentences: (1.) Men, before the cultivation of their reason through the experiences of advancing civilization, which show them the enormous advantages to all of dealing justly and kindly with one another, act chiefly under the impulses of mere animal selfishness which they share with the inferior creatures, holding might to be right. (2.) Men are labouring generally to get possession of the means, such as riches, station, and others (§ 44), by which to secure permanently the prime necessaries of life; but few ever think they have obtained enough of these, and almost none think they have got too much. Thus an eager, unceasing pursuit continues and often tempts to the commission of injustice towards others. (3.) Individual men, when they obtain riches or honours, are generally disposed to think they have acquired nothing but what was really due to some natural superiority in themselves, which they have then a natural right to defend or maintain. Thus Alexander the Great and Augustus Cæsar listening to the flatterers around them, at last believed that they shared with the gods a divine nature, much above ordinary humanity, which none should dare to question. Successful individuals are usually flattered, by many sincere people, who believe them to deserve their fortune, but always by many selfish people, who hope themselves to benefit by the favour of their hero. Other examples of pretension to a superior nature, are offered in persons whose ancestors had obtained titles of distinction or noblesse. These will feel shocked to be confounded with the vulgar crowd—for instance, the feudal nobles of old, among the serfs whom they sold with the cattle on their estates; or the Mussulmen, in some parts still, among the Greek Christians, whom, by the chances of war, they had reduced to a form of slavery, although direct descendants of the most illustrious people of antiquity. (4.) It is a remarkable fact, that men who, in their individual capacity, are upright, truthful, and generous, will, when banded with others, perpetrate monstrous injustice; as if the concurrence or countenance of companions proved that right was on their side. Class interests of all kinds range under this head—as of great commercial companies with or without monopolies, the owners of slaves, persecuting religious denominations or sects, political parties, clans or tribes at war, ready even to exterminate adversaries, &c. (5.) What is called *Fashion* is a wide-spread attempt on the part of the wealthy in society, and of others striving to imitate them, to keep themselves raised above and distinguished from the general mass by adopting and frequently changing new styles of dress, manner of living, language, courses of education, and so forth. (6.) To reach the top of the class to which one belongs is so powerful a motive of conduct with many, as often to lead astray. It may connect itself, however, with most laudable conduct. To be deemed the first poet, painter, architect, orator, mathematician of the time, may stimulate individuals to labours very beneficial to the public; but the ambition to be called the most powerful king or emperor, or the greatest conqueror, has often been the cause of direst evil.

§ 48. The particulars pointed at in the preceding paragraphs are influences which much interfere with the attempts of legislators to establish in communities universal justice; but the object sought is beyond price and its attainment merits any labour. No one can doubt of the advantage to a nation of having its affairs managed by the intelligence and calm judgment of the nation at large, through fit representatives, rather than by the absolute will of an individual. If that person be an hereditary chief, he may chance to be young, or ignorant, or weak-minded, or passionate, or may have had evil advisers, &c.,—accidents which cannot occur to an assembly or council. Brutal wars have broken out between two absolute monarchs on account of a single insulting word spoken by one against the other, as among the fierce lower animals almost any two may be excited to mortal combat, merely by being placed in menacing opposition. A burglary or act of housebreaking, accompanied by murder, is a most revolting occurrence; but war of causeless aggression is of the same nature, with horrors multiplied a thousandfold. (See Note to § 48.)

§ 49. The world, as a whole, cannot be civilized until there be established among the different nations, such a central authority to control any one nation threatening to disturb the general peace, as every single state exercises over the individuals who compose it. A country like France, which, within a century, has made successful hostile invasion of all the continental nations around it, when now again fully armed, compels every neighbouring nation to be prepared for events, by maintaining armaments as costly as those during actual war. A vast standing army maintained in a country which no adversary threatens is a grave menace to the surrounding states. Such an army does not like to be idle, and it may even coerce its chief. Representative institutions controlling the governments would go far to prevent such possible evils, and many persons now hope that these will soon be general in Europe.

§ 50. With respect to several of the subjects treated in this chapter, very hurtful misconceptions prevail among the less educated of the people.* But the means of uprooting all such errors of opinion, and of lessening the tendencies to most of the evils treated of in this chapter, are to be sought for only in improved general education, the subject of the next chapter.

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* See Note to § 118.

CHAPTER IV.

EDUCATION AND TRAINING.

(Read again the whole Summary from page 5.)

The lower animals, not having reason to be cultivated, are guided almost solely in obtaining their necessaries of life by the animal instincts and propensities; and thus sheep placed in any strange land which offers common herbage will thrive and multiply. Human beings have the like animal instincts before their faculty of reason is cultivated; so that children of the most ignorant savages, cast upon an island which produces eatable fruits and plants, would still thrive and multiply like the sheep. But to enable men to obtain necessaries, and to live in safety and comfort in a civilized community formed as above described, all must be trained, to a greater or less extent, in the six departments of knowledge and conduct noted below.

I. The *language* of the country, with the modes of *counting* and *measuring* in use there.

II. Knowledge of their country and of the population of which they are members.

III. The nature of *health* and the means of guarding it against the hazards of the climate and others.

IV. The *laws* and *morality* established in the country, breaches of which bring punishment.

V. *Industrial skill* in some bodily or mental labour useful in the community, by which a livelihood may be earned.

VI. *Theology* and *religion*, or sound views as to man's origin and destiny.

Accordingly, in the study of these six particulars, much of the early life of all born in the country is employed—about ten years among the poorer classes, and a longer time among the wealthy. Individuals who learn little and badly are left to act chiefly from the low propensities of the mere animal, and so continue for life, to resemble the animal. Those who learn much and well are raised above the ill-trained more than these stand above the brutes.

The young receive their education,—

I. At home, from parents, and by intercourse with friends and with the public, all aiding the teaching of individual experience.

II. From methodical teaching in schools, colleges, universities, churches, &c.

III. From books.

Great errors in the business of education have prevailed—in regard to the selection of subjects of study—the order of study—the methods of teaching; but the public attention, of late aroused to these, is promising important improvement.

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§ 51. That persons may be fit members of any club or company of people associated for a common purpose, as a party of emigrants going to a new colony, common sense sees that they must have knowledge and conduct in relation to the following six particulars:—

1. The language of the party, and how they count and measure.
2. The nature of the country and of the population of which they form a part.
3. Any dangers to health existing.
4. The regulations or laws made for the government of the company.
5. Skill in one or more of the kinds of labour, bodily or mental, required for the welfare of the company.
6. Anticipation of a happy future.

Now these six particulars are also those which, viewed more widely, constitute the whole essential education of the members of the larger club or company called a civilized nation. They there receive the technical names of

1. Literature and Mathematics;
2. Geography and History;
3. Physiology and Hygiene;
4. Government and Laws;
5. Science and Arts;
6. Theology or Religion.

These appear in their places in the table, or Map of Human Knowledge, given in § 30. The fifth branch, which regards the different callings or employments among men, comprises very numerous particulars, but an individual needs to know well the details of only one or two, provided he knows the outline or fundamental parts of the others.

§ 52. (1.) *The Language of the Country and the Measures used there.*—A man living alone in an island would have no use for language, for he would have no one to speak with; but a man living with millions of fellow-men, having all the same natural wants to be supplied out of stores not superabundant, and where all, therefore, become to a certain degree rivals and competitors for commodities already the property of other members of the community—such a man can obtain any particular thing which he wants only by giving some other thing which he possesses for it, or by offering to perform some service which may be useful to the party from whom he desires to purchase. Language is hence essential, to enable him to communicate his wants, wishes, and proposals to others, and to bargain. Then, by far the greater part of his necessary knowledge of the things and events of the world around him can come to him only through language. And indeed, as shown in a former paragraph, through language alone has the human race been enabled to rise above the condition of the houseless savage (see § 2).

As to *measuring or counting.*—A man could not estimate quantities of different commodities to be exchanged, bought, or sold, or of the money to be given for them, if he had not some standard of measure, nor could he bargain correctly for wages to be paid or received according to days or weeks of labour, if he could not count and compare accurately one thing with another, nor could he make appointments for future time, and so forth, in innumerable cases.

(2.) *As to knowledge of one's country and its inhabitants.*—He would be a very ignorant and dependent man who did not know that there were other streets, parishes, towns, and countries than his own, and how the forefathers of himself and others had fared on earth. His natural curiosity respecting such matters could be satisfied only by the study of *Geography* and *History.*

§ 53. (3.) *The nature of Health, and how to preserve it amidst the hazards of the climate and of faulty customs.*—A person in a fertile tropical island, if he merely obey the natural animal instincts as the lower animals do, can scarcely suffer in his health in regard to the four prime necessaries of life. (1.) He has always fit temperature in the natural climate. (2.) He has also pure air, for he requires not to shut closely the dwelling which shelters him. (3.) Of wholesome food and drink he has abundance in the plantains, cocoanuts, and other fruits hanging around him, and there is always pure water in the nearest brook. (4.) In procuring his food and drink he roams about in the fresh air, taking the necessary exercise; and nothing disturbs his natural rest. But the man of civilization, if he be ignorant, is in the midst of dangers. The artificial cookery tempts with many things, of which the continued use may be hurtful. Intoxicating drinks of many kinds, when taken to excess, act as poisons both to body and mind; and the use of them soon becomes a habit, which, when formed, is rarely overcome. He lives in a house with close-fitting windows and doors which prevent ventilation, while fires and lamps, and other sources of impurity, are constantly generating aërial poisons, where the knowledge necessary to secure perfect ventilation is very uncommon. He may have to guard against extreme cold in winter, and extreme heat in summer, which make great havoc in ordinary populations. The dress of fashion is very often unfit to answer the great purpose of maintaining properly the natural warmth. Consequences of these and other causes of disease, little suspected by the bulk of the people as now educated, are, that in many places almost half the children born die before the fifth year of their age; that many persons at middle age have ailment either of body or mind; and that the number who live healthily to old age is small indeed.

The prime necessaries of life are tabulated in the note to § 53 and 77.

§ 54. (4.) *Government, Laws, Morality, Honesty.*—The single man on his island can neither suffer nor perpetrate injustice, being alone; but a man in the midst of millions, among whom there are many who, if they could hope to escape punishment, would rob or kill him to get possession of his property, and others who would certainly punish him if he dared to take what belonged to them, is under the necessity of studying carefully what the law of the country is, and moreover, what is just and unjust in the nature of human relations. He must also be ready to aid the government, of whatever form it may be, to maintain throughout the community the observance of the laws and good usages (read § 45). It is to be remarked here that the word honesty or justice has two meanings in common use; first it designates the conduct which does not disobey any formal laws, as those against stealing or murder, for breach of which punishment is inflicted when the fault is proved; and, secondly, it designates also obedience to the general law which an upright conscience lays upon every one, "to do to others as the person would wish to be done unto if the position of the parties concerned were reversed." All persons owe heavy obligations to the civilized body of which they are members, which they cannot duly repay if they do not act upon the conscientious principle referred to, as is more fully shown in § 80 to § 90.

§ 55. (5.) *Industry or skill in some useful bodily or mental labour.*—The single man in an island where everything belongs to him, or at least to no one else, must still exert himself to gather his food—his shellfish from the shore, his fruit from the forest, and his drink from the rivulet; and the man in a civilized society has also to work, but in a different way. The solitary or savage has to procure every day the necessary food for the day, as all brute creatures do, not knowing often in the morning where it will be found; but the civilized man is one of millions of a co-operating brotherhood who have already collected a great store of the necessaries of life, and of mechanical and other means of constantly keeping the store replenished; and all persons whose parents or friends have not made them owners of superabundance must be employed in some of the labours which supply the stores; then each gets from the store quantities of the various things needed by him or her, proportioned to the contribution to the store, in any other form, which his or her labour has produced.

§ 56. All the arts of civilization, by practising which individuals now so easily keep replenished the stores of necessary or useful things, are founded on the four fundamental sciences set forth in the general table § 30. Some of these arts are very simple, as the carrying of a load, others more complex, and many require years of apprenticeship or special studies, as those of the blacksmith, carpenter, engineer, schoolmaster, magistrate, and so forth. The degree of civilization depends entirely on the degrees in which these sciences and arts are understood by numerous persons throughout the community; and it becomes of the highest importance to all, that encouragement be given to the study of fundamental science, as widely as possible—which means, that such study shall become part of general education. (§ 92 to § 96.)

§ 57. *Theology.—Man's Origin and Destiny.*—Man in the savage or lowly-civilized state is generally so entirely employed in planning and working to procure the bare necessaries of life, that his thoughts or speculations reach little beyond the passing time either backwards or forwards; but when the arts of civilization have advanced so far that the people have got tolerable security for abundance of food through coming time, and against aggressions of hostile neighbours, a strong desire or curiosity arises to learn as much as possible respecting the events of the far past and the probabilities of the future. This at last reaches to inquiry or speculation, independently of traditions, respecting even the origin and destiny of the human race.

§ 58. In gradually learning, as described in § 15, the admirable uniformity which holds in the course of natural events, men have at last obtained the clearest evidence that all creation has sprung from design, and from one Designer, of boundless wisdom, power, and goodness. While knowledge of the objects and course of nature was imperfect, the consummate order and unity which reign throughout could not be seen, and many events were attributed to the agency of distinct and often contending invisible beings. Thus a child, who has stumbled over some obstacle and has hurt himself, returns to kick or cudgel it, thinking that he thereby punishes and gives a lesson to a consciousness within it, in some kind resembling what he feels within himself. Savages in all parts of the earth have had such notions, only much more extensively; believing that everywhere, and connected with almost every phænomenon, there were spirits, demons, gods, or goddesses in activity. The Greeks and Romans, even when civilization was considerably advanced among them, held such opinions, and all the religions or wild superstitions which pervaded the ancient world were of the same character. To enlightened modern intelligence such notions appear irrational indeed.

§ 59. Familiar as men now are with marvellous devices of human ingenuity—as in time-keepers, which do not err by one beat of pendulum or balance-wheel in a year—electric telegraphs, spinning and weaving machinery, and endless other such things, they find the most perfect of these to fall infinitely short of arrangements everywhere found and now well understood, in the works of nature. Different persons have delight in contemplating different particular examples of the Creator's work. The organ of vision, or the eye, because so familiarly known to all, may be referred to here, as a good instance out of the multitude.

§ 60. *The Eye.*—One can imagine an order of beings to exist having all the faculties of man, mental and bodily, except that of sight. They might be inhabitants of a tropical island abounding in plantain, bread-fruit, and other eatable fruits and roots, and where there were no fierce animals or other enemies to hurt them. Such people could not by the sense of touch, which alone in them could gather the information, acquire a clear conception of even a single tree, with its distinct branches and leaves, by a month's labour of examination, any more than a stranger let down into a deep mine, and left there for a time in utter darkness, could describe on his return the objects placed there. Supposing, then, that such a sightless being were told that a new organ was to be given to him, a ball not bigger than a walnut, to be protected in a fit manner within his head, and which in a few moments, without his changing place, would enable him to examine not only a whole tree, with its every branch and leaf, but a forest of trees and all the other objects in an extensive landscape; and yet further, which organ would transport his sense over the ocean to examine islands scattered on its wide expanse—nay, which, when aided by a telescope, could take him mentally to other earths or planets wheeling around our sun at distances almost inconceivably great—what would be his wonder! and yet to be surpassed when he found that this eye, turned on the members of a present company, could discover many of the thoughts passing in their minds, even when wished to be concealed. (See Note to § 60.)

§ 61. If the eye thus contemplated proves admirable *design* and the attribute of *wisdom*, the vast universe of suns and worlds speaks the *power*, and the innumerable sources of human enjoyment speak the attribute of *goodness* in the Creator. Besides the satisfactions connected with the supply of the bodily wants, there are the exquisite delights which the human mind is made capable of receiving from the contemplation of tions, and even fierce wars between single nations and alliances of nations. (See Note to § 64.)

§ 65. It would be almost to doubt the attribute of goodness in the divine Author of the universe, to think that there is no remedy, in the honest working of the mental faculties with which man is endowed, for such evils as above referred to. And there is now good ground for hope that, with the extraordinary advance of general scientific enlightenment in recent time, and the vastly increased intercourse among all nations, the teachers of religion will gradually be in harmony. It cannot tend to keep them or their hearers at variance, but the contrary, if all are led to study attentively the book of the visible works of their Creator, about which there can be no difference of opinion, namely, this visible universe, the first revelation of Himself which the Creator makes to the senses and understanding of all human beings born into the world. This cannot clash with any subsequent revelation; but, as springing from the same source, must rather aid in the interpretation of any other where doubt may arise. Then it can only tend to lessen sectarian animosity to reflect that, according to the mental constitution given to human beings, children unhesitatingly receive as true, whatever religious opinions are taught by the parents, and in the great majority of instances adhere to these through life, even under severe trials and temptations. To persecute persons for honestly holding the religious opinions impressed upon them from early youth by the affectionate parents whom Providence willed they should have as their guardians and teachers, seems unnatural indeed. The Mahometans believe it to be a sacred duty imposed upon them to exterminate if they can all who follow other creeds than theirs, and particularly Christians, whom they call infidels, hateful in the sight of heaven; but this is not an example to follow for those whose religion says, "Love your neighbour," and "do to others as you would be done unto." (See Note to § 65.)

The actual state of education in England in regard to the six branches essential to well-being in a civilized community.

§ 66. Of the education sketched above, a large and very important part is obtained independently of books, from parents, friends, and intercourse with the world; the remainder is supplied by the methodical teaching of schools, colleges, and books. How much may be learned orally from intelligent instructors is known in the facts, that the art of printing is comparatively a late invention, and that for many centuries after the fall of the Roman empire, even the leaders of the conquering armies, when become princes and nobles of new kingdoms, were not able to read; and they did not allow their children to learn, because they believed that the inferiority of the people they had subdued was owing to having devoted so much attention to literature instead of to military exercises. Book studies were at that time left chiefly to ecclesiastics and a few others. This feeling in regard to letters was still strong in the time of Charlemagne; and in England, in 1547, a statute was passed allowing the benefit of clergy "to a lord or peer of the realm, although he could not read."—1 Edw. VI. c. 12.

§ 67. Every man may be said to begin his education or acquisition of knowledge on the day of his birth: certain objects which excite vivid sensations, when repeatedly presented to the infant, are recognized and distinguished. The number of objects thus known gradually increases, and from the constitution of the observer's mind are soon associated in the memory, according to their resemblances or other obvious relations (as explained in § 25). This early part of education is necessarily of the most mixed kind, being determined chiefly by what is called accident. It consists of particulars from every branch noted in the three columns of the table or chart of knowledge given in § 30, and chiefly of the portions from these which make up the six parts essential to the education of members of a civilized community. Thus a child has soon noticed the sun, moon, and stars, in the sky above him; thereby learning something of (1) *Astronomy;* at the same time he notices the features of the country around his home—its fields, rivers, hills, and perhaps the sea, and he is told that similar objects exist beyond his field of view, to a prodigious extent: in this he is learning something of (2) *Geography.* He may see passing along, cart-loads of paving-stones, marble, coal, &c., which are samples, taken from mines, of the solid crust of the earth; this is (3) *Mineralogy.* He sees a variety of trees, plants, and flowers, (4) *Botany;* and he soon knows a variety of animals, as dogs, horses, birds, &c., (5) *Zoology.* Similar illustrations might be given of the commencement of his acquaintance with all the other branches in the table.—As regards the six selected essentials referred to in the summary: the children begin quickly to learn the names of the principal objects and phænomena offered to their notice, and of the actions of the people about them, (1) *Language.* With respect to (2) *Health,* they are soon taught by their watchful parents to avoid the many common dangers, as of fire, falls, surfeit, &c. They are taught not to hurt others, not to take what is not their own, &c., (3) *Morals.* They soon learn to employ their bodily powers in light labours, and to use tools, as knife, scissors, hammer, &c., (4) *Industry.* And they receive commencing instruction in the (5) *Religion* of their parents. All this happens within the first few years of an ordinary life. Of many particulars of the highest importance, the parents, and especially the good mother, who is always with her children, are the first teachers, such as the common use of the mother-tongue, the fit behaviour towards different classes of persons, &c.; and the parents never tire in warning how precious honesty, truth, and other parts of conduct called virtues, are; and how pernicious the contrary vices of fraud, lies, and so forth. Such are the beginnings or foundations of knowledge, on which future years of experience have to rear the superstructure of attainments befitting the various conditions of persons in a civilized community.

§ 68. The more methodical or systematic education of schools, colleges, and books, is founded on the great discovery made, that there is such harmony between the mental faculties of human beings and the objects and phænomena of the surrounding world that when the mind is led to contemplate these in their natural, that is to say, in their scientific relations, it can learn and retain incomparably more than when the particulars are presented in the accidental confusion of common experience. To determine that natural order as a direction for study has been attempted in Chapter II., ending with the table § 30, and to facilitate the selection which should guide individual conduct is the object of the present chapter. Few persons are fully aware that the science of nature has to be considered as a continuous study or history, which, to be clearly comprehended, must be pursued in the natural order of its parts, just as any ordinary history must be read in the natural order of its paragraphs; and that a student can scarcely make a more valuable single acquisition than, early, to have in his mind a clear general conception of the universe, with the relation of its various parts to human well-being. A useful illustration of this subject exists in a comparison of two cases which much resemble—1st, that of a person about to emigrate to a new colony, who has received a purse of money sufficient to purchase all the necessaries for his voyage and first settlement; and 2nd, that of a young man who has a certain amount of time to be employed in the studies which should fit him for his voyage of human life. The first, for want of wise counsel, may expend much on things valuable perhaps for other purposes, but useless to him, while necessaries of vital importance are forgotten or omitted; and the second, from misdirection in his studies, may be very busy, but letting precious years run utterly to waste: he may spend his time and labour in the study of ancient languages which he will never have to use, or of the higher abstractions of mathematics which are not required in the business of common life; and this to the exclusion of much other knowledge on the possession of which his future prosperity must depend.

The Methodical or School Teaching of Language.

§ 69. To understand early and to be able to use readily the language or mother-tongue of the country in which a person resides, is of primary importance, for through or by means of language the far greater part of all other knowledge has to enter the mind. This was explained in § 2, which may now be read again as introductory to the present section. The practice was therefore befitting which is now generally adopted, to begin school labour with the study of language, including the connected arts of reading and writing it, and of using ciphers in the simpler operations of counting and measuring.

§ 70. Children acquire language naturally, and with marvellous readiness, when they hear the names pronounced while the things and phænomena themselves are before them; and the nearer any artificial teaching approaches to this type the better does it succeed. After the invention of printing, however, and the vast multiplication of books, this important truth seemed for a time to be forgotten, and written descriptions were often substituted for the realities. About the end of the last century, Pestalozzi, in Switzerland, and others elsewhere, recalled public attention to the subject by their admirable plans of object-lessons. Reflection had shown that to teach children names or words without giving clear ideas of the objects was a near approach to what is done in teaching parrots; and the error reached great absurdity when in the same way several sets of names in different languages for the same things were taught to the same individuals. A boy might thus learn three or four names for a horse, and yet scarcely know a horse from a cow; and if he learned sets of names with very erroneous ideas of the things, he had not acquired, as some people imagined, a new sense with every new language, but an additional means of publishing his own ignorance.

The universe is single, and knowledge of one language containing names for all objects and phænomena of importance, becomes a key to all the knowledge which men have accumulated. This truth was evident in the case of the Greeks, who had only their mother-tongue, and had not traced that, as modern scholars have been able to do, to more ancient languages, from which it had been gradually moulded; but they were not thereby prevented from achieving, in all departments of literature and art, degrees of excellence which the educated world still admires, as unsurpassed by anything which later times have produced.

§ 71. It is to be observed, however, that the modern nations of Europe, after the great political changes and confusion of languages and the dark general ignorance which followed the fall of the Roman empire, had, on the revival of letters, to learn their elementary knowledge of various sciences from old books, written in the Greek and Latin languages, and thus, naturally, many Greek and Latin names were retained. These being composed of root-words which had no meaning to persons speaking only the rude modern languages of the time were obstructions as well as aids to progress. This evil had then, and still has, to be met, either by teaching the root-words from short glossaries easily learned in a few weeks, or by exacting study of the languages in their syntax, which is a labour of as many years. The latter mode has been unwisely forced on many persons who could ill spare from other studies, the time so occupied. (See Note 119.)

§ 72. It is a fact of grave importance that the English language, not being written in the letters of an alphabet expressly made for it—that is to say, having a distinct letter for every distinct sound, as original or phonetic alphabets have—but in the Roman alphabet, which has no letters for several of the English sounds, is therefore read at first with much difficulty even by the native English, and few foreigners can learn to read or pronounce it well unless they have resided for years in the country. This is the more to be regretted, because, from the rapid multiplication of the English race in new colonies, quickly becoming nations, the English language will necessarily soon be more generally spoken and studied over the world than any other. The imperfect alphabet is to the inhabitants of this country a much greater evil than most persons have suspected; for the length of time required in the lower schools, to give facility of reading, is so large a part of the whole time which the poorer classes can allow for school training, that many of the children do not acquire enough to encourage them afterwards to go on, and leave school soon to forget all. Thus to a large proportion of the lower classes, books remain unused or sealed-up treasures. In England, as in other countries of Europe placed under the same disadvantage, changes have been from time to time made to improve the spelling of the national language; but at present England, in this respect, is much behind some other nations. (See Note 120.)

§ 73. Another evil of great importance, diminished of late, but still existing in the school system in England, is, that the mother-tongue has been comparatively neglected, while nearly the whole school-time has been devoted to the attempt, in very many cases little successful, to give familiarity with Greek and Latin literature. If the power of clearly expressing one's thoughts in some language, and of perfectly understanding clear expressions from others, be so precious as is described in § 2, there can scarcely be conceived a more injurious procedure than to prevent people from studying fully their mother-tongue, through which the whole business of their lives has to be transacted, by compelling them to devote the time which should be so employed in the study of languages no longer in living use among men. The reason was strong some centuries ago for bestowing much attention on Greek and Latin, when no book of value existed in Europe which was not written in one or other of these languages; but now the case is completely reversed, for to learn any matter of physical science, except what Euclid treated, from such old books is to learn error, or at least knowledge far short of modern erudition. 'Another reason for the study of Latin was that scientific men desired to have one common language by which those of all nations might have communication with one another. They now have several.

§ 74. In the other advanced countries of Europe much attention has been given to the cultivation of their modern languages and literature. In Italy the Academy della Crusca had charge to watch over the state and progress of the national language, and every university there had a professor to expound and comment on the works of their immortal Dante. Similar interest has been shown in France, Spain, and Germany; but in England, only lately has there been a professor of English literature in any of the universities. It will not be asserted that the literature of England was less rich than of the sister kingdoms; and there were reasons why such aids were more wanted there than elsewhere. The mass of the people in England speak a language in which much more than half the words are of Teutonic origin; while the language of persons who have studied chiefly Greek and Latin books in the higher schools and universities, contains an excessive proportion of words of Latin and Greek origin, and is, therefore, but partially intelligible to the common people. On this account complaints are heard that sermons composed by university men are often imperfectly understood by many who hear them; and the census taken in 1851, proved that a considerable portion of the people in England do not attend church at all. The competitive examinations lately instituted by Government, for appointments in various branches of the public service, and in which the proficiency of the candidates in their own language is tested, will contribute much to lessen the evil here under consideration.

The plan of this "Brief Survey" does not admit of details respecting the natural growth of languages from their simple elements, and the changes which living languages have been and are constantly undergoing, particularly where they have not been more or less fixed by the art of writing. But these matters are of deep interest, as furnishing a singularly clear analysis of the faculties of the human mind in their varied modes of action. Horne Tooke, in his remarkable work on the structure of languages, entitled "The Diversions of Purley," has said truly that Locke's book "On the Human Understanding" might almost as fitly have been called a book "On the Philosophy of Language."—As little is there room here for detailed notice of the different kinds of schools, which now exist under the names of infant, ragged, reformatory, industrial schools, and others, for different classes of learners. Much valuable information respecting these will be found in the Report of the Royal Commissioners on Education which has just appeared.

§ 74 B. *Counting* and *Measuring.* — Knowledge of these subjects for common purposes is so simple and easily acquired, that the ordinary experience of individuals, in any civilized community, teaches a considerable amount. Just as a child does not first learn to speak by abstract rules of grammar, nor to walk by rules of dynamics, nor to swim by hydrostatics, and yet many children are seen to talk, and walk, and swim remarkably well; so children who never heard of algebra and geometry judge fairly of number and size. To count and measure exactly, however, familiarity must be obtained with precise standards of comparison. All other *numbers* are compared conveniently with the number of the fingers, ten, the basis now of the ordinary decimal arithmetic: all *lengths* may be compared with that of the human foot; *surfaces* with the foot-square, to which the relations of triangles, circles, ovals, &c., are then easily found; and *solids* with the solid square or cube, to which the relations of cones, globes, pyramids, &c., are then ascertained. Very moderate study by a good method, in ordinary schools, gives such knowledge of these matters as serves for ordinary purposes; and for the orderly regulation of the affairs of a civilized community, and even of single households, no part of ordinary education is more important than this. It is possible, however, to carry the examination of relations among magnitudes so far that a life may be passed in studying only a part of them, as in applications to some parts of astronomy. One of the errors in the school systems in this country has been, to devote too much time to what is called the higher mathematics, at the expense of neglecting other matters of general importance.

On Methodical Teaching of Geography and History.

§ 75. A wild bird can always find its own nest, however artfully concealed from the eyes of other creatures; similarly the fox or rabbit finds its burrow. Rooks never mistake their own tree or bough in the midst of a rookery; and they know where, among surrounding fields and woods, to seek the necessary food for themselves and their young. Moreover, they can distinguish as their enemy, the farmer with his gun, and as their friendly neighbours, the cow or sheep. The swallow comes and goes with the seasons, between even distant quarters of the earth, and unerringly finds its way to the same old turret or overhanging roof which sheltered its nest before. Now the man of a civilized community needs vastly more knowledge of these kinds, for he has relations of interest more or less direct with almost every part of the earth. This earth he has at last discovered to be a vast globe of nearly eight thousand miles in diameter, with warm countries producing things precious to him, on the parts most directly exposed to the sun's rays, and with cold countries on other parts covered with ice and snow. In good schools now, with the aid of maps and globes, exhibiting the earth in correct miniature, the young student can, in a few days, learn well the whole outline and divisions of the earth—called the *geography;* and through the arts of language and writing he may have brought clearly before his mind's eye the most remarkable events which have taken place among the inhabitants in past ages—enabling him to foresee much of what is to happen in ages to come. *History*—Persons unfavourably placed may have their acquaintance with such matters limited to what concerns only their own village or parish, and the short span of the lives of themselves, or of their kindred; but only feeble minds can rest contented with such scraps of knowledge, after being made aware of how easily, in a good school, the whole can be taught.

On Methodical Teaching in Schools of what regards Life and Health.

§ 76. In § 53 the striking statements were made, that nearly half the children born into the world die before the age of five years; that of persons of middle age, many have imperfect health of body or mind, and that only a small proportion reach or exceed the age of three score and ten, which is often therefore called a natural term or span of human life. In many localities the report is still more unfavourable. Now inquiry into the subject has ascertained that a great part of such premature mortality is due to causes which better knowledge spread among the people would enable them easily to remove or to avoid; and that if these causes were removed, not only would average life be prolonged, but the value of life, estimated by the amount of enjoyment in a given time, would be much increased. Strange to say, notwithstanding the knowledge of these facts, so clearly proved by statistical returns, and the evidence afforded in learning to read, write, and cipher, of how vastly more efficacious systematic teaching by competent instructors in schools is, in regard to such subjects, than the inferior help which might be given at home, the plan of school teaching has not yet been adopted for the subjects of life and health. Within a few years only, have formal lessons, under the name of physiology, been given in some advanced schools. A common excuse which mistaken educators have offered for not including health lessons in their school courses, has been that they deemed the children too young to be interested in or sufficiently to understand the subjects. Facts now show how very erroneous this supposition was.

§ 77. In the note to the section, § 53 (which see), there is given a table setting forth, in the first column, the four prime necessaries of life, namely, *pure air, warmth, aliment,* and *rest after action.* In the second column appear the names given to deficiency; and in the third those given to excess, of the four particulars. At the bottom are noted the two kinds of *noxious agents,* violence and poisons. The proper use of the things enumerated in the first column produces the feelings called pleasure, maintains health, and favours long life. The deficiencies and excesses set forth in the other columns, and the noxious agents enumerated below, produce pain, and cause the states called *diseases,* which shorten and destroy life. It gives remarkable simplicity to all inquiries respecting health, to know that among the things and influences around man on earth, there are only the four here noted which he needs to obtain, and two which he needs to avoid, that he may have uninterrupted health for as long as the human constitution is formed to last, and that therefore, only by some want or misuse of the few requisites, or by the direct agency of the noxious agents can his health be impaired or his life shortened.

A person who has not already reviewed this subject in a general way will be struck to find how large a proportion of the diseases known to him are attributed, even in popular apprehension, to errors committed in regard to the particulars noted in the table; for instance, how many of the diseases of England are known to proceed from fault in regard to temperature alone—the winter colds, catarrhs, quinsies, pleurisies, croups, rheumatisms, &c.; how many others from insufficient or bad food among the poor, and from surfeit or too stimulating food among the rich; how many others from crowded or ill-ventilated apartments, or neighbourhoods of impure atmosphere; and lastly, how many from too sedentary occupation and want of exercise.

On Methodical or School Teaching in regard to Property, Law, and Morals.

§ 78. If it be a grievous error in the education given to the young of a civilized community, to leave, as was described in § 76, to the chance of parents at home being able to teach efficiently what regards the management of health, instead of employing competent teachers in schools, still graver is the error when the matters left to such chance are the subjects of *property, justice, honesty*, and the laws made by governments to maintain and protect these.

§ 79. *Property.*—Even the lower animals have among their instincts a feeling that anything obtained by the exertion or labour of any one of them to supply a natural want, as of food, &c., has become the property of that one, so that if another attempt to take the thing away, the first possessor will resist, and, if of nearly equal strength, will fight even to the death rather than yield the prize. The perception that such fight, with pain and wounds, would be the result of the attempt to seize, prevents many such attempts, unless where the aggressor has decisive superiority of strength, and then might among all brutes becomes or decides the right. Thus are brutes almost constantly at war among themselves, killing and devouring one another.

§ 80. Human beings, endowed with the faculty of reason, have clearer and wider conceptions of the nature of property, and of the uses of protecting it, in proportion as their reason is more cultivated. All see that a person, who by knowledge and labour converts any of the rough materials which nature freely offers, into objects of utility—as when a savage chooses in the wild forest suitable parts of trees and reeds, and of these forms bows and arrows—that such products of his skill and industry belong entirely to him, or are his property to all intents and purposes, to be used by himself only if he will, or to be passed as a gift to any other person, or to be exchanged for some other object which he at the time needs or prefers. And, further, it is perceived that persons having superior skill and industry, and prudent regard to futurity, may save and accumulate or store property of various kinds and to any extent, thereby gathering what is called wealth. In civilized society the word property is used also to mean, not only material wealth which can be stored in houses, but also peace of mind, esteem of others, and any means of happiness arising from honest sources.

§ 81. A man is said to have a *right* to the property acquired by him as above described. When no person or persons deprive him of any good which he possesses, then *justice* is said to prevail, and the conduct of those who do not attempt to take or keep what does not belong to them is called *honest*. That a man should pay any debts which he has contracted, and fulfil the promises made by him, and do everything, for the not doing of which he might justly be punished, is called a *duty*.

§ 82. It is the object of government and laws to protect all kinds of honestly-acquired property, as well as the life or person of every member of the society, against any other person or persons who might wish dishonestly to take property or to hurt the person; and these ends are sought by means of laws made to forbid the dishonest or hurtful acts, and by infliction of such punishment for breach of the laws as may deter from the commission or repetition of the forbidden crimes. In § 45 it was shown that, without such laws and executive authority in societies, men could never have risen much above the condition of the lowest savages.

§ 83. Law and punishment are founded on the great fact of its being the nature of man to act that he may obtain pleasures and avoid pains. Before any action, therefore, the person naturally weighs the reasons or the consequences, whether speedy or remote, for and against the action, and decides according to the judgment formed as to the side on which the advantage in regard to happiness lies. The right conduct, therefore, depends much on the correctness of the individual's knowledge of futurity, that is, of the natural course of events. A savage may know that a neighbour has property which would be serviceable to him, but foreseeing also the probable fight and danger if he attempt to take it, he is restrained. A man in a civilized country in which there are laws and good police, may be tempted to steal or seize, but he knows that if he be caught, the law will punish him severely, and he refrains. If he be ignorant of the law and of the chances, he may run the risk, but being caught he will be punished and will suffer many times more pain, besides loss of public respect, than a hundred successful thefts could procure him of pleasure. The confirmed thief scarcely ever escapes detection beyond a short time. It is thus discovered that, even with a view to this world only, "honesty" on the whole "is the best policy." When a person has been trained to believe that he acts his part in the world under the notice of an all-seeing and just Ruler, whose command it is that all shall act with honesty in every form, and who will weigh every act and thought, and punish or reward accordingly, in distant futurity, the security for good behaviour is the strongest possible; for endless punishment infinitely outweighs any pleasure which the longest life here can offer. Children naturally hold to be true all that parents tell them as truth, and when thus taught future responsibility, they for a time will practise what they believe; but if they afterwards discover that their parents themselves do not always act as if they believed what they had preached, the children too readily disregard the good advice given, and follow the bad example.

§ 84. One would be pleased to watch the working of the human mind, if, in deciding upon courses of action, it were always guided by such calm balancing of consequences as above contemplated, for then the knowledge necessary to sound decisions could without fail be given; but, unhappily, the mind is liable to be influenced also by any past habits, which bring certain trains of thought and feeling more vividly into the mind than others, and the decision, being then influenced more by the vividness of the conceptions than by the true comparative importance of the particulars, erroneous conduct may follow. In this is shown the importance of watching the early formation of *habits* as carefully as the acquisition merely of *knowledge.* When certain trains of thought are produced with great intensity they constitute what are called *passions,* which take such possession of the mind that for the time, only thoughts connected with the object of the passion have access. Among the strongest of the passions are those connected with love, ambition, avarice, gaming, &c. In persons under the influence of any one of these, the judgment for the time becomes unsound or insane, the reason for the time seems prostrate.

§ 85. The laws of a community naturally multiply and become more complex as civilization advances, because the relations among persons become more numerous with the increasing subdivision of labour and employments; but it happens, strangely, as may appear to many, that while it is easy to describe in words the great majority of crimes, as theft, murder, breaches of formal contracts, &c., there are still some of deepest dye which can not be described with sufficient exactness to make them punishable by law; for instance, filial ingratitude. For revolting instances of this, which bring the gray hairs of affectionate parents with sorrow to the grave, there is no legal punishment.

§ 86. And there are many persons, so dishonest in spirit, as to call fair any act of theirs which the law cannot reach to punish. Some of the foulest instances of injustice ever perpetrated have been the work of such unprincipled men, skilled in the imperfect wording of the laws, who have perverted these to their purposes, against the clearest requirements of natural justice.

§ 87. In all such cases of crime, however, as above referred to, although the law cannot be brought to bear on them, the human mind has such power of weighing truly all the circumstances, that, while the person suffering feels acutely the injustice done, the criminal, when he allows reflection, sees the full magnitude of the guilt. The common sense or reason, while thus judging, is called conscience. On the mental power here described is based the golden rule, the Divine precept, "Do always to others as you would be done by."

§ 88. A person born into a civilized community, when at last educated to have a correct notion of his position on earth, finds, that he is one of a great self-renewing society which has gradually advanced from a more or less savage state of humanity to the comparatively elevated civilization actually existing, through the means or agencies described here in Chap. III., namely, (1) Division of Labour, (2) Commerce, (3) Increase of Population, (4) Government and Laws, (5) Education, (6) Religion, which means could produce their admirable effects only where honesty to a certain extent prevailed among the people; that is to say, where the majority, directed by reason, were acting towards one another and towards the society, as *instinct* leads some inferior gregarious animals—bees, ants, rooks, cattle, &c.—to do; namely, not to hurt or annoy one another, by disturbing the common peace, but mutually to afford help. The names given to the different parts of such conduct which affect the interests of society are placed in the following table. In the first column stand those which effect benefit, by some classed as forms of Honesty and Kindness, or Justice and Benevolence, and fitly called Social Duties or Virtues; and in the second column are the contraries of these, called Social Vices or Crimes.

§ 89. *Duties to Society.*	*Crimes against Society.*
1. Honesty, or Justice.	1. Dishonesty, or Fraud.
2. Useful Knowledge.	2. Ignorance, Unskilfulness.
3. Activity.	3. Laziness, Indolence.
4. Sobriety, or Temperance.	4. Drunkenness.
5. Truthfulness.	5. Lies, Deceit.
6. Economy, or prudent saving.	6. Wastefulness.
7. Friendly conduct.	7. Selfish or heartless conduct.

§ 90. Unless all the qualities enumerated in the first column prevail to a considerable extent among the people, as was shown with respect to probity merely, in § 54, the society never could have risen to civilization; and if, from any cause, the practice of them were suspended, there would be speedy relapse into barbarism; and this would be true whatever form of religion were professed in the country. In the world, hitherto, all societies have been very mixed, containing good and bad members. While the individuals practising the good qualities have by their steady, intelligent, and therefore very productive labour of body or mind, been not only maintaining but increasing the wealth and general well-being of the community; the other class, of bad and irregular workers, thieves, liars, and disturbers of the peace—have, in the food and clothing, which they necessarily consumed, been destroying more than they produced; and whether supported by relatives, or as public beggars, or inmates of poor-houses and prisons, they were costly burdens on society. Where bad persons have children, these are likely to be so badly trained as to follow the example of the parents, and to augment the amount of criminal population. Dr. Franklin, who well understood the springs of human action, offered to the less educated classes of the community many good lessons, and among these describes the effect on the condition of a working man, of determining to save or lay by only one penny a day of the wages he earns. (Note 121.) In London, in winter, when severe frost puts a stop to various kinds of out-door labour, troops of able-bodied workmen sometimes appear in the streets, howling for help to stay starvation, men generally earning ample weekly wages, but spending every farthing before the end of the week, and much of it in the public-houses, for gin and tobacco—an exhibition of improvidence more like that of brutes than men.

§ 91. That the substance of the last paragraphs, when suitably explained to young persons, is clearly intelligible to them, and when well taught is powerfully influential on their mental state or character and future conduct, has been amply proved of late in various well-conducted schools, the children trained in which have been sought eagerly by employers. The school in the parish of King's Sombourne, Hampshire, managed by the Rev. Richard Dawes, now Dean of Hereford, was a remarkable example. But proof was scarcely wanted by those who believe that "if you train up a child in the way he should go, when he is old he will not depart from it." This great truth, however, is not yet acknowledged in the school system of English education, in regard to teaching the general economy of a civilized society. The name Social Economy, often given to the subject without sufficient explanation of its import, has occasioned misconception to many, and has rather repelled from the study than favoured it. (See Note 122.) The extreme importance of making this a part of common school education rests on the permanence and strength of the impressions made on the young; and the possibility of then giving them early good habits, which if not formed early are never formed. The vivid convictions may then be established that "honesty is the best policy" even for this world; and that a man can never be erring when obeying the injunction "to do to others as he would be done unto." To children who have had the inestimable advantage of good Christian training, every one of the kinds of good conduct enumerated in the above table is seen also to be a religious duty, and every one of the bad kind is seen to be a sin. It would be as great an error not to bring this religious influence to bear on the young mind as it is in some teachers of religion to omit entirely exhibiting the advantages of good morals in regard to this world. As certainly as a man who is a drunkard, liar, cheat, &c., will fall into indigence and die a pauper or culprit, so certainly will the honest, truthful, diligent man obtain independence, health, and happiness for himself and those dependent on him.

On Methodical Early Teaching of the Four Fundamental Sciences.

§ 92. The civilization of a community is the result gradually produced of the numerous arts which have sprung up according as men have increased in their knowledge of the objects around them, and especially of the laws of the changes or phænomena going on among these objects. The laws, shortly sketched in Chapter II., are of but four kinds, *Mechanical, Chemical, Vital,* and *Mental.* Ordinary experience gives to persons but slight and very incorrect knowledge of these laws; yet in none of our common schools have they been taught systematically so as to insure sound acquaintance with them at small cost of time and trouble. In past ages the arts were almost entirely empirical; that is to say, were useful results, of which the causes were not known; for instance, the arts of the brewer and wine maker, and rude smelters of iron. These workers not knowing that there existed in nature the substance now called oxygen, which plays so important a part in the chemical operations above named, and in others innumerable, and which forms seven-eighths by weight of all the water on earth, although in its separate state it cannot be exhibited but as a gas or air of which a cubit foot weighs little more than an ounce—not knowing oxygen, they were totally ignorant of all the intimate changes among ultimate elements going on in their different operations, and they consequently often suffered severe disappointment in results.

§ 93. Now, however, almost all industrial operations are known to be ruled by the laws of the fundamental sciences acting in a known way on known things; and while so many entirely new arts have sprung up from acquaintance with the laws, most of the old arts have thence been singularly improved. For instance, the modern steam engine arose but lately from the discovery made by the two friends, Dr. Black and James Watt, of what is called latent heat; and the easy extraction of the all-precious iron from apparently valueless brown stones, but in reality iron ore, came after the discovery by Dr. Priestley, less than a century ago, of the oxygen, already named—iron, of which, the great majority of common tools and machinery are made, and of which, more recently, our railways are made, and our largest ships, palaces, bridges, and other structures. In almost all departments of industry now, scientific knowledge, or head-work, is wanted as much as hand-work.

The business of the farmer even, or agriculturist, which until lately was deemed so simple that almost any person could practise it with success, is now employing, and with great profit to all concerned, professors of mechanical and chemical engineering, and breeders of stock skilled in the laws of life; through these, and with improved machinery for ploughing, threshing, and draining, and improved manures, and more skilful rotation of crops, &c., the same extent of land is caused to yield, both of corn and cattle, several times more than double what it did in past time. The old-fashioned race of clodhoppers is quickly wearing out, and workers of varied intelligence are taking their place. The expensive machinery, now with great profit employed in almost every kind of labour, cannot be safely intrusted to ignorant or stupid people. The cost of a single great steam-ship of the present day, with all its fittings, would have sufficed to equip whole fleets of war-ships such as the Greeks and Romans had; and yet such gigantic ship in voyages round our globe is safely intrusted to the skill and steady conduct, not of an Archimedes, but of trustworthy working engineers and mariners, trained now among the industrious classes of England.

§ 94. From the preceding considerations it is evident that the maintenance of the arts of civilization in their present advanced condition, and the further development of useful arts, depends on the diffusion of fundamental or scientific knowledge among the people; and it has been proved that such knowledge can, in good educational establishments, be satisfactorily taught at less cost of time and money, and with unspeakably greater satisfaction to the parties, than the imperfect acquaintance with the two dead languages which until lately has occupied almost exclusively the attention of pupils in schools of the middle and higher classes in England.

§ 95. The curriculum, or course of general scientific education copied here (in Note to § 95), and which accords with that sketched in the Introduction to his 'Elements of Physics,' published in 1827, was prepared by the writer when he had the honour of serving as a member of a committee of the senate of the University of London, appointed in 1859 to consider what should be the nature of the examination of candidates offering themselves for the degrees of Bachelor and Doctor of Science, then to be instituted by the University. It is intended to exhibit in natural order and due amount, the parts of complete general education. Every tolerably informed man in modern society acquires unavoidably, in his intercourse with society, partial knowledge of all the branches here noted, and by orderly study he might easily acquire a well-proportioned acquaintance with the whole. To effect this object, methodical teaching of the four fundamental sciences which govern all the arts of civilized life must be adopted in the higher schools generally.

§ 96. The greatest sum of knowledge acquired with the least trouble is that which comes with the study of the general and simple truths of science, fitly illustrated by well-chosen examples. To the man who understands these truths, very many phænomena which to the uninformed appear prodigies are only interesting illustrations of his fundamental knowledge; and this he carries about with him, not as an oppressive burden, but as a charm which supports the weight of other knowledge, and enables him to add to his previous store, and in the proper places, every new fact of importance which may present itself to his notice. With such a principle of arrangement, his information, instead of resembling loose stones or rubbish thrown together in confusion, becomes as a noble edifice of just proportions and firm contexture, and is acquiring greater strength and consistency with the experience of every succeeding day. (It has been a common prejudice to think that persons thus instructed in general laws had their attention too much divided and could know nothing perfectly or in detail; but the very reverse is true, for general knowledge renders all particular knowledge more clear and precise.) (See the Notes to § 95 and § 96, A, B, C, D.)

The Methodical School Teaching of Natural Theology.

§ 97. Some of the facts and reasonings relating to what is called Natural Theology are sketched at § 57. Sound minds, if not biassed by erroneous impressions made in early years, find in such facts convincing proofs of the existence of the Creator, with his attributes of boundless wisdom, power, and goodness. The very important additions to men's knowledge of the universe made in comparatively recent time have added much to the force of these proofs. Then, in the opinion of many enlightened teachers of Christianity, the benign influence of which has spread over and civilized the modern world, natural theology offers powerful assistance in establishing the Christian doctrines.* Notwithstanding these considerations, natural theology has not yet been systematically taught in the schools, colleges, or churches in England, the same error being committed with respect to it as with respect to the other three branches of the training of civilization treated of in the few preceding pages—namely, the study has been left to what is called chance. As the objects and phænomena of the material world around men are the first things which affect their senses and understanding, they may assuredly be considered the first revelation which the Creator makes of himself to human beings. They constitute what may be called the book of the Creator's works, open alike to all men in all countries, and respecting which instructed minds cannot have any differences of opinion which further reference to facts will not at once remove.

§ 98. To minds acquainted, even in a moderate degree, with the facts on which men now build their natural theology, all the false religions and superstitions which in former times sprang up in the world are so evidently absurd, that with the spread of the true knowledge they must all entirely cease; and the only religion which will bear the test of such examination is that one already named, which preaches the practice of universal justice and benevolence, and which is now professed in all the more civilized countries of the world. This being the fact, it would have seemed natural that, if other provision were not made for the purpose, in the general plans of education, the ministers of Christianity should have undertaken the teaching of natural theology as part of their office; but it has not been so. One great impediment seems to have been that referred to in § 64, namely, the disagreement among these ministers as to the true interpretation of what they hold to be the miraculous revelation respecting invisible or spiritual things. Their differences having led civil governments to interfere, and each of these to declare that the doctrines adopted by it were the truth, and all doctrines differing were false or erroneous, and farther to command assent to such decisions, regardless of the conscientious belief of individuals,—persecutions in all horrid shapes, and domestic and foreign wars, have been consequences, and the clergy in every country, being necessarily mixed up with such discord, have had their minds more or less drawn away from the calm contemplation and teaching of the perfect order and harmony of God's universe.

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* See the Notes to § 63 and § 97.

§ 99. Among the evidences of the wisdom and goodness displayed throughout nature, none are more striking than the harmony existing between the faculties of man and the arrangements in the world around him which make him a progressive being, or capable of civilization. The great branches of civilized training bring all this into view. What, indeed, is more admirable than—(1) the faculty of language and the mental powers which it manifests? or (2) than the laws of life and health, through knowledge of which man can so much augment his happiness? or, (3) than the clear perception of the consequences of maintaining in societies, by efficient motives, natural justice and benevolence? or, (4) than the simple laws of motion or changes in nature on which are founded all human arts? or, (5) and lastly, than the direct evidences now easily made manifest to ordinary minds of the existence and attributes of the Divine Author of all? If the education of the clergy of all denominations had to include sufficient general acquaintance with these important particulars, which were then to be treated of from the pulpit among the proofs of divine wisdom and goodness, the teachers of congregations would not only increase the range and value of their religious instruction regarding invisible things, but would also be giving lessons of the highest importance concerning worldly well-being, which much influences the religious state, and in both ways would be endearing themselves to their hearers.

Public loss from Immethodical Study.

§ 100. The loss to the English community from not being led to study methodically, or according to school system, the several branches of the education that fits men for civilized life may be reviewed as follows:—

(1.) *Language.*—A considerable portion of the people are not sent to school at all, and of those sent many do not learn to read and cipher readily enough to be able to turn their acquisition to much profit.

(2.) *Health.*—Only about half of the children born live to the age of five years, and scarcely half of those who live longer can be said to have perfect health of mind and body.

(3.) *Justice and Benevolence.*—Many fewer than half are led to have a practical belief in the truth, that perfect integrity or honesty is the best policy, and that judicious benevolence shown towards others naturally brings a rich reward.

(4.) *Science.*—But a small part of the people are taught the simple fundamental laws or principles which rule all the arts in which they labour, and hence their work is less perfect and less abundant than it easily might be rendered.

(5.) *Natural Theology.*—Only a few of the people are taught systematically the proofs offered by external nature, and which common sense, rightly led, clearly perceives, of the existence of the Creator and his attributes, lessons which harmonize with, and tend powerfully to aid, the teaching which many persons believe will at last bring all the nations on the earth to form one Christian brotherhood. (See Note to § 63.)

§ 101. Besides the great losses to the community from the omission of important branches, in many of the courses of school and college education in England, and from attention being given almost exclusively to Greek and Roman literature, there are other faults yet to be noticed. (1) The mode of beginning to teach a subject through abstractions and wide classifications of the parts, instead of, as nature does, by first giving knowledge of particulars, which are afterwards to be classified according to their resemblances. It would be deemed in the highest degree absurd to resolve that children should not be led to read or attempt to understand any composition in their mother-tongue until they had learned all the rules of the grammar, and the import of all the technical words and terms used in the grammar—as, the parts of speech, noun, pronoun, verb, participle, &c.; the declensions, with cases nominative, genitive, dative, &c.; the conjugations, with their moods, indicative, subjunctive, &c.; but this is nearly what is ordinarily practised in regard to boys beginning to study Latin. The result is, that six years or more are spent in learning, very imperfectly, what, according to Milton, who was himself a schoolmaster, and others of similar authority, might, by a better method, be learned in one year. (See note to § 101.) (2) The same kind of error is committed in regard to the study of geometry and algebra, and it is known how few of the pupils become adepts. (3) Nearly the same fault bars the door to many wishing to study physical sciences, who are erroneously told that the attempt is useless, unless they have previously advanced far in mathematics. (4) The attempt is made, in many schools, to teach various branches of knowledge simply by giving lectures and rules, where practice and examinations are required, almost as much as in teaching music or eloquence. (Note 123.) (5) There has been the evil, that the honours, prizes, scholarships, &c., at various schools and colleges have been offered for proficiency, not in the branches of knowledge which are necessary to civilized well-being, but in the Greek and Roman classics and the higher mathematics. The competitive examinations lately established by Government, in which successful candidates gain lucrative appointments in the public services, have gone far to correct this fault. It was seen that the restricted knowledge which commanded the highest prizes at Oxford and Cambridge did not suffice to fit a man for the general business of life; and other branches were added in the examination papers.

§ 102. And there has been a fault, greater than any of those above referred to, in what may almost be called a prohibition of general cultivation of the mind, to the female sex. It has been shown above that for men, whatever their special calling or employment in society may be, they all require, besides the special knowledge connected with that calling, to possess also fair knowledge in each of the six branches which fit people to act well their part in a civilized community. Surely the same is not less true of women; but further, as mothers become the chief teachers, for years, of all the children born, in the most important parts of their education, namely, the early formation of the moral habits or character, the well-being and progress of society is closely connected with the ability of the mother-teachers. To teach and train children may be called the great special business and profession of women. Then, a well-informed wife is to her husband a second self, whose judgment in many cases may greatly help him. That wives may be well capable of rendering all the expected services, they have no need to labour for years, as many of their brothers have done, in the study of the learned languages; but, by gaining familiarity with the chief parts of the six branches, they insure sound cultivation of all their higher faculties. To leave daughters imperfectly educated in these important branches is to condemn half the human race to the non-employment of many of their best natural gifts.

§ 103. Some of the important faults noticed in the preceding paragraphs did not exist in the educational plans of the ancient Greeks. (1) They studied their *mother-tongue* with singular care. (2) To direct them in guarding *Health,* they had the valuable works of Hippocrates. (3) Law and morality were the common subjects of discussion in the public assemblies, open to all free citizens. (4) Industrial arts had made little advance among them, but geometry to a small extent, which directs many of the proceedings, was part of liberal study. (5) The popular theology, it is needless to say, was very low; but the speculations on morals of Socrates and Plato are still read by scholars with great interest. (See Note to § 101.)

§ 104. Many of the defects and errors in common education, above treated of, arise from persons not being in general taught to carry in their minds a clear conception of the whole field of human knowledge, and of the comparative importance of the different subdivisions as set forth in the map or table, § 30. He whose view is limited to a few of the departments, will probably have very false ideas even of them as he will certainly of the whole. His mind, compared with that of a person properly educated, becomes what the mis-shapen body of a mechanic, crippled by confinement to the few postures and actions of his trade, is to the body of the active mountaineer or the perfect form exhibited in a Greek statue.

§ 105. One of the reasons why, at the present time, so many of the multitude have very narrow and incorrect notions of the great domain of knowledge, is the retention, in the modern languages of Europe, of the old Greek and Roman names of many of the departments of knowledge, as explained in § 71. These names had distinct meanings to those who first made and employed them,—as *astronomy,* the laws of the stars, from *aster,* star, and *nomos,* law; or *geography,* the description of the earth, from *ge,* earth, and *grapho,* describe, &c.; but to persons not knowing Greek, such names are at first meaningless, and therefore, also, less easily recollected. To the Greeks the mere names of the branches made all persons aware of the absolute necessity to them of acquiring acquaintance with the subjects beyond the small measure obtained in common intercourse with the world; and attention, according to leisure, would be directed to obtain more: but to moderns, who have not had leisure to study Greek, the Greek name often appears to mark something foreign to the business of common life, and therefore interesting only to persons of much leisure or of scientific profession.

Education from Books.

§ 106. All have now the satisfaction of knowing that defects and errors of school and college education can to a great extent be prevented or repaired by the use of Books; and that books well chosen and well employed, may even to many persons serve in lieu of the school itself and its master.—By arranging knowledge according to the natural relations, and thereby avoiding repetitions and ill-timed anticipations, a very useful systematic abridgment or outline of human knowledge may be condensed into one large volume or a few volumes of moderate size, constituting the *Book of Nature.* Many attempts have been made in recent times to produce such a book, and gradually, with greater success. From such a work, read by the student alone, or when he has intelligent companions with whom to converse on the subjects, and with less trouble than it now costs to obtain the smattering of Latin or Greek commonly given at schools, a man may obtain a most useful acquaintance with general science. And such is the close relation of the departments of science among themselves, that consummate skill in any one may be acquired more easily by first studying the whole in a general way, and then applying particularly to that one, than by fixing the attention, from the beginning, on it exclusively.

§ 107. During the complete review of science and art made in a previous study of generals, individuals are better able to choose the occupations in life suited to their powers and character. There is the further important consequence, that persons early brought to understand the beauty and grandeur of creation, acquire an elevation of mind which renders them much less liable afterwards to fall into the sinks of indolence and vice that now engulf so many.

§ 108. The increased facility of study and amount of acquirement here contemplated, would by no means, as some might suppose, put an end to distinctions among men according to their learning. The plan provides for more sound and useful information for the mass of the people in the fundamental parts of knowledge; but it leaves the unlimited fields of mathematics and experimental research, belles lettres, natural history, —and the accomplishments of music, games of address, manly exercises, the use of the pencil, modern languages, &c., as open as ever to persons of leisure and peculiar taste. It is true that the whole intellect of the community would be awakened, and that natural talent existing anywhere would be elicited and employed in what it were most fit to undertake, but these results would produce only general advantages to the state.

Two remarkable facts, respecting Education in England.

§ 109. With respect to the present state of education in England, there are two remarkable facts claiming attention here. The first is, that although few persons had carried the analysis of the subject of education so far as is attempted in these pages, a strong feeling was suddenly awakened, about fifty years ago, throughout the country, that a better education than then given to the mass of the people was required. (The following novelties started up, of which the names soon became familiar to every ear: the Bell and the Lancaster Schools; the Owen and Wilderspin Infant Schools, Mechanics' Institutes, Libraries, Museums, &c.; the London University and King's College in London, and other colleges in the provinces;) proprietary schools to prepare for these; and gradually the Industrial, Ragged, and Reformatory Schools. At the same time appeared many good books for popular use; as those from the Society for the Diffusion of Useful Knowledge, like their 'Penny Cyclopædia,' and other valuable publications through Charles Knight; and similar works by the Messrs. Chambers, of Edinburgh, and others. And at last there exists in activity, which, however, needs yet to have its proceedings modified, the Committee of the Privy Council for Education, with its large expenditure of above 800,000*l.* annually.

§ 110. The second fact referred to is, that although great public good has been effected by the means above enumerated, not a little surprise and disappointment have been felt by the benevolent promoters of the great work, that the classes of the people for whom the boons were intended have seemed most inadequately to appreciate the advantages offered. They have availed themselves of them to a much narrower extent than was anticipated. The children of the working classes are withdrawn from school about their tenth year, when many have learned so little and so imperfectly that it is soon forgotten. The youths of the middle classes are withdrawn from higher schools about sixteen years of age; and of those of the upper classes a small proportion indeed go to the universities. Some of the spacious halls or buildings lately erected, which were expected to be always occupied by eager students of science, have fallen to serve also inferior purposes.

§ 111. It has been common to attribute the state of things here described to parents' ignorance of the true importance of education to the future well-being of their children, or to their indifference, or, among the poorer classes, to their selfishness, forcing the children prematurely to engage in work which could earn something towards the family expenses. But a truer account of the matter, in many cases, will be found to be, misconceptions still remaining among school authorities, in regard to the kinds of instruction required in the schools, and to the suitable modes of teaching—faults which it has been a chief purpose of Sections 100 and the following, of this book, to point out. Parents of all the classes have judged aright, in deciding that there was waste of time in studying things of little importance for after life, while other things of great importance were either imperfectly taught or entirely omitted. —In the Transactions for 1859 of "the National Society for the Promotion of Social Science," there is a communication from the Rev. Barham Zincke, vicar of Wherstead, and Chaplain in Ordinary to the Queen, himself an Oxford man, which confirms so forcibly parts of what has been said here on the subject, that two paragraphs are extracted in the Note to § 111.

Happiness.

§ 112. [Having now given a general view of man's condition on earth, in passing through various stages of civilization, with the sources of his pleasures and his pains, it seems opportune to remark that the question has been put, whether, as men by making a selection of particulars from the various sciences have built up the art of medicine, or the cure of diseases, and by selecting other particulars have formed other arts, as of navigation, architecture, and so forth, whether it be not possible similarly to build up an art of Happiness, easy to learn and practise, which may secure to the people generally a much larger amount of enjoyment than is now the common lot. The very practical philosopher and philanthropist, Dr. Benjamin Franklin, strongly asserted the possibility of such an art, as appears in a letter of his published in his works, written to Lord Kames, the Scottish judge, in 1760, after a lengthened visit at his country residence. During this it appears that the two friends conversed on the subject with so much satisfaction, that Franklin called the time passed there "the month of the most solid happiness he had known." Franklin had then expressed his intention of writing on the art. It appears, however, that the pressure of matters connected with the great interests of his country during the establishment of the American independence, did not allow him the required leisure, for no such writing was left among his papers. A sketch is presented here, in the Note to § 112, which may suggest useful reflections to one speculating further on the subject.

Conclusion.

§ 113. Notwithstanding the various impediments above reviewed, to the complete education of advancing civilized communities, great progress in civilization has already been made. The following sketch is extracted from 'The Elements of Physics':—

"In remote times the inhabitants of the earth were divided into small states or societies, often at enmity among themselves, and whose thoughts and interests were confined much within their own narrow territories and rude habits. In succeeding ages men found themselves belonging to larger communities, as when the English heptarchy became united, or more lately when England, Scotland, and Ireland have become one; but still distant kingdoms and quarters of the world were of no interest to them, and often were totally unknown. Now, however, a man feels that he is a member of one vast more civilized society which covers the face of the earth, and no part of the earth is indifferent to him. In England, for instance, a man of small fortune, nay, even a journeyman mechanic who is honest, sober, and intelligent, may cast his regards around him, and say, with truth and exultation, 'I am lodged in a house that affords me conveniences and comforts which some centuries ago even a king could not command. Ships are crossing the seas in every direction to bring what is useful to me from all parts of the earth; in China men are gathering the tea-leaf for me, in the West India Islands and elsewhere they are preparing my sugar and my coffee; in America they are cultivating cotton for me; elsewhere they are shearing the sheep to give me abundance of warm clothing; at home powerful steam-engines are spinning and weaving for me and making cutlery, and pumping the mines that minerals useful to me may be procured. My patrimony was small, yet I have railway-trains running day and night on all the roads to carry my correspondence and to bring the coal for my winter fire; nay, I have protecting fleets and armies around my happy country, to render secure my enjoyments and repose. Then I have editors and printers, who daily send me an account of what is going on throughout the world, among these people who serve me. And in a corner of my house I have BOOKS—the miracle of all my possessions, more wonderful than the wishing-cap of the Arabian tales, for they transport me instantly, not only to all places, but to all times. By my books I can conjure up before me to a momentary existence many of the great and good men of past ages, and for my individual satisfaction they seem to act again the most renowned of their achievements; the orators declaim for me, the historians recite, the poets sing.' This picture is not overcharged, and might be much extended; such being the goodness and providence which devised this world, that each individual of the civilized millions that cover it, if his conduct be prudent, may have nearly the same happiness as if he were the single lord of all."

§ 114. In concluding this "survey of progress," the remark may be made, that striking illustration of much that has been written is offered in the past history and present position on earth of the so-called Anglo-Saxon race.—The inhabitants of Britain and its colonies have much less claim to be considered a distinct race or family than most other nations. Julius Cæsar, nearly 2,000 years ago, found here, Britons or Celts, rudely clothed in skins of beasts, with their druidical priesthood practising human sacrifices. The Romans afterwards held England for nearly 400 years as part of their empire, and they mixed considerably with the natives. After Rome fell, there were successive invasions of England by many races, Picts, Caledonians, Saxons, Danes, Swedes, Norwegians, and lastly Normans, all of whom had possessions to a greater or less extent, and became parts of the population. (The ultimate and more recent fortunes of the mixed races seem to have resulted, not from peculiarities of race, but rather from the insular position of the countries, and what are called political chances, as the wars of the rival houses of York and Lancaster, the contentions of the Stuarts with their parliaments, and strong religious contentions, in all of which the leaders had to court the favour of the masses, and thereby awakened their energies, sharpened their intelligence, and taught habits of self-reliance.) In the 'Elements of Physics,' published in 1827, the author, after treating of modern scientific discoveries, remarked as follows:—

"But there is a change going on in the world connected closely with the progress of science, yet distinct from it, and more important to the general welfare of men than any single scientific discovery; it is the diffusion of existing knowledge among the mass of the people. Formerly knowledge was shut up in convents and universities, and in books written in the dead languages, or in books which, if in the living languages, were so abstruse that only a few persons had access to their meaning. Thus, considering the human race as one great intellectual being, a small portion only of its intellect was allowed to come into contact with science, and therefore into activity; which fraction, moreover, was but feebly exerted, because sufficient motive was wanting. The progress of science and art in those times was correspondingly slow. Now, however, many of the barriers which confined the stores of wisdom have been thrown down, and a flood is overspreading the earth. Old establishments are adapting themselves to the spirit of the age; new establishments are arising; the inferior schools are introducing improved systems of instruction, and good books are rendering every man's fireside a school. From all these causes there is growing up an enlightened *public opinion*, which quickens and directs further progress, and through the medium of a free press, although unheeded by many, is now rapidly becoming the governing influence in the world. In the British Isles, and partly, no doubt, as a consequence of the insular position, which lessened among its inhabitants the dread of hostile invasion, and sooner formed them into a united or compact people, the progress of enlightened public opinion has been more decided than in other states. Early consequences of this were more free political institutions, and these have gradually led to greater and greater improvements, making Britain a study and example among the nations. One colony of her children, imbued with her spirit, has spread in the northern half of what is called the new world of America; and, although it has not yet been independent for a century, it already counts twice as many people as Spain*, and its population must soon surpass that of Europe taken altogether. The example of the Anglo-Americans is influencing also other states in the western hemisphere, all aiming, too, at free institutions. In the last-discovered continent of Australia, which is nearly as large as Europe, and empty of men, colonization is spreading with a rapidity never before witnessed; and that fair portion of the earth will soon be covered with the descendants of free-born Englishmen. From thence still onward they and their institutions will naturally spread over the vast archipelago of the Pacific Ocean, a tract studded with islands of surpassing beauty and fertility.* Such, then, is the extraordinary time of revolution or transition in which the world at present exists; and where, it may be asked, is this progress to cease? Thus far at least we know, and rejoice to see, that the world is filling with happier human beings; and that through increase of knowledge and arts, thousands of men can now maintain themselves in comfort and noble elevation of mind,

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* The inhabitants of the American States have more than doubled since this was written. They now exceed 30 millions,

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equalling the population of England. It is painful to think that within a few months they have fallen into violent civil contest, originating in the existence among them of Negro Slavery; but they doubtless will soon be at peace again, and, with improvements in their government arrangements, will regain their former prosperity. The population of the Canadas, north of the United States, now exceeds two millions, being nearly that of the United States in 1775, when the independence was declared. The present increase in Canada is still more rapid than was that in the United States.

* This has already, within twenty years, happened in regard to New Zealand, which, from resemblance to the British Isles in the size of the islands and other particulars, has been called the Britain of the South.

in places where, with ignorance, only a few miserable savages could gather a scanty and precarious sustenance."*

§ 115. To be aware how active the Anglo-Saxon mind continues to be, in labours of invention and discovery, one has only to reflect that since people still living in England were born, the following novelties have sprung up there:—Watt's steam-engine, already become the labouring giant for the whole world—steam navigation—the railway—new machinery for spinning, weaving, and printing—gas-lighting—electrical telegraph—photography—penny postage.

§ 116. And seeing what marvellous advance in civilization has already sprung from man's increasing knowledge of nature, although the art of diffusing such knowledge by education has been very imperfect, the mind looks cheerfully forward to what must yet come when better education shall enable the people to turn to full account the capabilities of this glorious universe in which it has pleased Divine wisdom and goodness for a time to place them. The feeling of the duly instructed man towards his Creator, is not the abject terror of the slave before a hard master, but like that of the favoured child approaching with delight a wise and indulgent father.

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* In the above paragraph mention was not made of the British Empire in India, containing about 180 millions of people, about to receive the benefits of European civilization, nor of the now prospering settlements around the Cape of Good Hope. It may interest the reader to compare this sketch of progress, written more than thirty years ago, with that of Lord Macaulay, written twenty years later, and given here in the Additional Note to § 114.

ADDITIONAL NOTES.

Note to § 5.

Extracted from the Journal of H. M. Ship the 'Beagle,' Captain Fitzroy, employed in 1832, in surveying, among other places, the coasts of Terra del Fuego, near Cape Horn.

"While going one day on shore near Wollaston Island, we pulled alongside a canoe with six Fuegians. These were the most abject and miserable creatures I anywhere beheld. Amongst the central tribes of the country the men generally have an otter skin, or some small scrap about as large as a pocket-handkerchief, which is hardly sufficient to cover their backs as low down as their loins. It is laced across the breast by strings, and according as the wind blows it is shifted from side to side. But these Fuegians, among whom there was a woman, were quite naked. It was raining heavily, and the fresh water, together with the spray, trickled down her body. In another harbour not far distant a woman, who was suckling a recently born child, came one day alongside the vessel, and remained there, out of mere curiosity, whilst the sleet fell and thawed on her naked bosom, and on the skin of her naked baby. These poor wretches were stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, and their gestures violent. Viewing such men one can hardly make oneself believe that they are fellow-creatures, and inhabitants of the same world. At night, five or six human beings, naked, and not protected from the wind and rain of this tempestuous climate, sleep on the wet ground coiled up like animals. Whenever it is low water, winter or summer, night or day, they must rise to pick shellfish from the rocks. If a seal is killed, or the floating carcass of a putrid whale discovered, it is a feast; and such miserable food is assisted by a few tasteless berries and fungi. They often, like other savages, suffer from famine. I heard Mr. Low, a sealing master, intimately acquainted with the natives of this country, give a curious account of the state of a party on the west coast. A succession of gales prevented the women from getting shellfish on the rocks, and they could not go out in their canoes to catch seals. A small party of the men one morning set out, and the other Indians explained to him that they were going a four days' journey for food. On their return Mr. Low went to meet them, and he found them excessively tired, each man carrying a square piece of whale's blubber with a hole in the middle through which they put their heads, as the Guachos do through their punchos or cloaks. Mr. Low believes that whenever a whale is cast on shore, the natives bury large pieces of it in the sand, as a resource in time of famine; and a native boy whom he had on board once found a store thus buried. The different tribes when at war are cannibals. From the concurrent but quite independent evidence of the boy taken by Mr. Low, and of others, it is certainly true that when pressed in winter by hunger they kill and devour their old women before they kill their dogs. The boy being asked by Mr. Low why they did this, answered, 'Doggies catch otters, old women no can.' This boy described the manner in which they are killed, by being held over smoke and thus choked. He imitated their screams as a joke, and described the parts of their bodies which are considered best to eat. Horrid as such a death by the hands of their friends and relatives must be, the fears of the old women, when hunger begins to press, are more painful to think of. We were told they often ran away into the mountains, but that they are pursued by the men and brought back."

This shocking report did not deter a zealous missionary party, under the guidance of Captain Allen Gardner, of the Royal Navy, from visiting the country in 1850. The details of their disappointed hopes, and sufferings, before they all perished by famine, as extracted chiefly from their own diaries, afterwards recovered, were published in the newspapers of the time. Since then another party repeated the attempt with equally disastrous result, as reported in the newspapers of 1860.

Note to § 6 A.

Extracted from the Report of a Journey of Inspection made by order of the Governor-General of India through the province of Oude, by General Sir William Sleeman, in the year 1848. From pages 207 to 222, vol. i., is given the detail of what is here abridged:—

Wolves are numerous in the ravines along the banks of the river Goomtee, on which the city of Lucknow stands. The Hindoos have a superstitious dread of destroying or even injuring them. As a consequence a great many children are carried off by them from the towns, villages, and camps, to be devoured—so many, that some vagrants make their living by searching near the dens of the wolves for ornaments of the precious metals which had been worn by the children.

There was in July 1847, at Sultanpoor, a boy who had been found alive in a wolf's den. A trooper passing along the bank of the river about noon saw a female wolf leave her den, followed by three cubs and a little black boy. The boy went on all fours, and seemed to be on the best possible terms with the old dam and the whelps. They all went down to the river and drank, without perceiving the trooper, who sat on his horse watching them. When they began to move back the trooper pushed across to cut off and secure the boy, but the boy ran as fast as the wolves, and they all re-entered the den. Help was obtained from the nearest village; and when with pickaxes the people had partly opened the den, the old wolf bolted with her three cubs and the boy. The boy was intercepted, while the others were allowed to escape. He seemed to be about nine years old.

The people who took the boy to the village had to tie him, for he struggled hard to rush into every hole they came near. They tried to make him speak, but could get nothing from him but an angry growl or snarl. In the village crowds came to see him. When a grown person approached he was alarmed, and tried to steal away; when a child came he rushed at it with a fierce snarl like that of a dog, and would try to bite. He rejected with disgust any cooked meat offered, but raw meat he seized with avidity, put it on the ground under his paws like a dog, and ate it greedily. He would let no person come near him while eating, but he allowed a dog to approach and even to share the food. His parents saw him, and recognized him by very clear marks of former injuries remaining near the marks of the teeth of the wolf which lifted him away when he was about three years old; but he was so stupid, that the parents, being poor, left him to charity.

This boy lived afterwards for nearly three years, being cared for during the last two by the servants of Captain Nichollet. He went on all the time nearly as above described. The servants took great care of him, but could never induce him to speak nor to wear clothes of any kind. He was inoffensive when not teased, but when teazed he growled. He drank by dipping his whole face into the water. His features were coarse and repulsive, and his habits were filthy. Captain Nichollet, in a letter to Sir W. Sleeman, at the end of three years, said the boy had just died,—in August 1850.

Sir William describes seven other cases of boys so taken and reared by wolves from near the same river, within a few years of the time of his visit; all were nearly in the same brutish state. Had there been only one case, the conclusion would have been drawn that there had been originally defective mind in the individual; but as several of the boys were recognized by their parents, who gave assurance that they had originally no defect, it would seem that the peculiar circumstances had arrested their mental development. None of them learned to speak more than a few words: several of them ran off again to the woods, as some savages have done after education among white people. One had been taken and protected by a hermit when the mother wolf died. He had learned to speak a little more than the others, but he could give no further account of his early life than that the wolf died long before the hermit. Of another it is related that, when sleeping under a tree near a sentinel and the person who cared for him, two young wolves were seen to approach and smell at him. He awoke, but, instead of being frightened, he put his hands to their heads and began to play with them. They were driven away on that occasion; but next night three came, and twice afterwards four came: they licked his face with their tongues. This boy afterwards escaped to the jungle.

None of the boys, except the hermit's, exceeded eleven years of age, as if the wolves, fearing them when they grew big, had destroyed them.

(Extracted from the 'Lahore Chronicle,' March 1861.)

Wild Beasts in India.—Everybody is aware that wild beasts abound in the jungles of India, but few people have the remotest idea of the frightful number of human creatures, especially of children, that are destroyed by them year after year. In the two past years 1859 and 1860, no less than 998 children were so killed, principally by wolves, as shown in the Report.

	Men.	Women.	Children.
In 1859			
were killed . .	6	1	467
and injured . .	33	3	83
In 1860			
killed		4	432
injured	24	6	55

4,223 wild animals were destroyed, for which Government paid 14,336 rupees as rewards.

	Tigers.	Leopards.	Bears.	Wolves.	Hyenas.
In 1859 . .	12	192	187	1174	2
1860 . .	35	163	350	2060	30

Note to § 6 B.

Extract from 'The History of Poland, written in several letters to Persons in England by Bernard Connor, M.D., of Oxford, F.R.S., Member of the London College of Physicians;' who, in his travels and residence at Court in that country, collected these Memoirs from the best authors, and from his own observations, vol. i., p. 342. Published originally in Latin, 1698.

"No part of Poland's dominions abounds more in wood and desert than Lithuania, and there is one forest, of above a hundred miles long, in which people are very wild and ignorant, though the gentry of Lithuania, for the most part, are more polite, more sociable, and more active and spritely than the Poles. It was assured me often at Court, and it is certainly believed all over the kingdom, that children have been frequently nurtured by bears, who are very numerous in these woods. There was one kept in a convent in my time who was taken among them as I have described in my Latin Treatise* of the suspension of the laws of nature. He was about ten years of age (which might be guessed only by his stature and aspect), of a hideous countenance, and had neither the use of reason nor speech. He went upon all fours, and had nothing in him like a man, except his human structure; but seeing he resembled a rational creature he was admitted to the font and christened; yet still he was restless and uneasy, and often inclined to fight. But at length being taught to stand upright by clapping up his body against a wall, and holding him after the manner that dogs are taught to beg; and being by little and little accustomed to eat at table, he after some time became indifferently tame, and began to express his mind in a coarse and inhuman tone; but asked concerning his course of life in the woods, he could not give much better account of it than we can of our life in the cradle. Upon this occasion I was assured by the king himself, several senators, and other great men of that kingdom, and moreover it is the common and undisputed report, that children are oftentimes nourished and brought up by bears in these parts. They say, likewise, that if a hungry he-bear finds a child that has been carelessly left anywhere, he will immediately tear it to pieces; but, on the contrary, had it been a she-bear, then giving suck, she would undoubtedly have carried it safe to her den, and nourished it among her cubs, which after some time might probably have been rescued from her and taken by hunters, as it happened in another case of this nature in the year 1669, which has been positively asserted to me in a letter from his Excellency Monsieur de Cleverskerk, now ambassador here to his majesty King William from the states of Holland, which letter I thought not amiss to insert.

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[*] Dissertationes Medico-Physicæ. Oxon. 1695. Art. 15, page 181.

" Thus in English (1698).

" ' Sir,

1 Jan. 1698.

" ' I shall endeavour partly to satisfy your request, and to give you an account of a boy that I saw at Warsaw in the year 1660, who had been brought up by bears. Coming to this city of Poland, with design to be present at the election of a king after John Casimir, who had abdicated the Crown, I inquired what was worth seeing in and about this place, whereupon I was informed, among other things, that there was in the suburbs of this city (which go towards King Casimir's palace) in a nunnery a certain male child, who had been brought up among bears, and who had been taken some time before at a bear-hunting. Upon this information I went immediately to that place to satisfy my curiosity, where I found the aforesaid boy playing under the pent-house before the nunnery gate. His age, as well as I remember, I guessed to be about twelve or thirteen. As soon as I came near him he leaped towards me, as if surprised and pleased with my habit. First he caught one of my silver buttons in his hand with a great deal of eagerness, which he held up to his nose to smell. Afterwards he leaped all of a sudden into a corner, where he made a strange sort of noise not unlike howling. I went into the house, where a maid-servant informed me more particularly of his manner of being taken; but having not with me the book wherein I wrote my observations in my travels, I cannot possibly give you an exact account of it. The maid called the boy in, and showed him a good large piece of bread, which when he saw he immediately leaped upon a bench that was joined to the wall of the room, where he walked about upon all-four. After which he raised himself upright with a great spring, and took the bread in his two hands, put it to his nose, and afterwards leaped off from the bench upon the ground, making the same sort of noise as before.

I was told that he was not yet brought to speak, but they hoped in a short time he would, having his hearing good. He had some scars on his face, commonly thought to be scratches of the bears. Thus, sir, you have all that I can remember of a curiosity that I saw so long time since, the truth of which nobody ought to question since there are so many examples in history; and I have been informed in this country that when, as the Tartars make frequent incursions there, which they perform with such extraordinary swiftness that they can overrun great part of the country in a very short time, their horses being able to travel a whole day together without drawing bit; being arrived at the proposed place they immediately quarter themselves in a great circle, whereby, as it were in a net, they take all that come within their clutches, and carry them into slavery, so that either the men or women, finding themselves thus ensnared, and endeavouring to escape, have oftentimes not leisure to take care of their infants; and therefore probably this boy may have been left behind after the like manner, and found and borne away by the bears, of which there are a great number both in Lithuania and Poland. I am sorry, sir, I cannot give you a more satisfactory account of this matter, but I hope this will suffice for a testimony of my good will, and to assure you that I am,

"'Sir,
"'Your most obedient servant,
"'J. P. VANDEN BRANDE DE CLEVERSKERR.'

"'Jan. 1, 166$\frac{3}{4}$.'

"For another confirmation of this matter of fact I have the testimony of an authentic author, M. Christopher Hartknock, of Passenheim in Ducal Prussia, who writ two books of the state of Poland. He says, that during the reign of John Casimir, in the year 1669, there happened an accident which perhaps might hardly be credited by posterity; which was, that there were then two boys found by a company of soldiers among the bears in the woods near Grodna, one of which, as soon as he saw the bears assaulted, fled into the neighbouring morass, whilst the other, endeavouring likewise to escape, was taken by the soldiers and brought to Warsaw, where he was afterwards christened by the name of Joseph. He was about twelve or thirteen years old, as might be guessed by his height, but his manners were altogether bestial; for he not only fed upon raw flesh, wild honey, crab apples, and such like dainties, which bears are used to feast with, but went, like them, upon all-four. After his baptism he was not taught to go upright without a great deal of difficulty, and there was less hopes of ever making him learn the Polish language, for he always continued to express his mind in a kind of bear-like tone. Some time after King Casimir made a present of him to Peter Adam Opelinski, vice-chamberlain of Posnan, by whom he was employed in the office of his kitchen, as to carry wood, water, &c.; but yet could he never be brought to relinquish his native wildness, which he retained to his dying day, for he would often go unto the woods among the bears, and freely keep company with them without any fear or harm done him, being, as was supposed, constantly acknowledged for their fosterling.

"I might here, sir, give you several other accounts of this nature which I had related to me when I was in Poland; and I am told Mr. Gibson, a parliament man, has formerly seen some other examples of this kind; but by what I have already mentioned I believe you will be sufficiently convinced that the history of Romulus and Remus is not so fabulous as it is generally conjectured to be, and as I thought myself it was before I had been in this country; for considering that brutes (since philosophers and divines will allow them no rational souls) breed up their young merely out of a natural instinct or sympathy which I need not here describe, I see no improbability why they may not likewise bring up those of another kind, as we have several instances daily; but I will not insist longer upon these philosophical matters, nor examine here whether examples of this nature refute or establish innate ideas, as I have done in my Medicina Mystica, but will conclude.

"Sir,
"Your very obedient servant,
"B. C."

Note to § 11.

Now that the electric telegraph has become common over the earth, and men know that a certain contact or impulse at one end of the wire acts almost instantly at the other end, however distant, so that a message may thereby be transmitted to the distant point, and even printed in permanent characters for any language, it is interesting to consider the resemblance of this to the apparatus of sensation in the animal body. The nerves are truly as electrical wires conveying from around to the brain sensations, which remain impressed on the memory, as photographs remain after the touch of the sunbeams. The sensations from the different organs differ, partly probably from the structure of the nerves, but certainly also from the thickness or nature of covering by which the delicate nervous substance where the impression is first received is defended from the rough contact of external things: thus

(1.) The nerves of touch are imbedded at their outer ends chiefly in the tough substance of skin or flesh, well fitted to bear strong impulses.

(2.) The fibres of the nerves of hearing have little immediate covering, but are safely lodged within chambers in the hardest bone of the body, called the petrous portion of the ear bone: they are there acted upon by the very gentle impulses or tremulous movement of the soft air in the cavities of the ear, which movement is begun externally by such vibrations as of musical strings, the substance of bells, &c.

(3.) The nerve of the eye is still more delicately lodged, having the form of a naked lining called the retina, spread over the back wall of the chamber of the eyeball, to which the undulations of light, resembling, but incomparably more delicate than those of air and sound, enter through the transparent cornea or window in front, to form perfect miniature pictures there, exactly as in a camera obscura.

(4.) The nerves of taste are imbedded in the soft moist membrane which lines the mouth, and are affected, not by simple impulse, but by the chemical qualities of the substances, diffused in the saliva.

(5.) The nerves of smell are similarly imbedded in the lining of the nostril to be affected by odorous particles diffused in the respired air there passing.

Note to § 18.

Extracted from Sir John Herschel's admirable 'Discourse on the Study of Natural Philosophy.'

"Galileo exposes unsparingly the Aristotelian style of reasoning. The reader may take the following from him as a specimen of its quality. The object is to prove the immutability and incorruptibility of the heavens, and thus it is done:—

I. Mutation is either generation or corruption.

II. Generation and corruption only happen between contraries.

III. The motions of contraries are contrary.

IV. The celestial motions are circular.

V. Circular motions have no contraries.

- *a.* Because there can be but three simple motions.
  1. To a centre.
  2. Round a centre.
  3. From a centre.
- *b.* Of three things one only can be contrary to one.

c. But a motion to a centre is manifestly the contrary to a motion from a centre.

d. Therefore a motion *round* a centre (*i. e.* a circular motion) remains without a contrary.

VI. *Therefore* celestial motions have no contraries, *therefore* among celestial *things* there are no contraries = *therefore* the heavens are eternal, immutable, incorruptible, and so forth.

It is evident that all this string of nonsense depends on the excessive vagueness of the notions of generation, corruption, contrarieties, &c, on which the changes are rung.—See Galileo, *Systema Cosmicum*, Dial. i. p. 30."

Note to § 26.

It is interesting to consider how man's knowledge of the universe around him begins, and grows in close connection with the state and changes of his own body, which he naturally considers as a central object of comparison, or a standard of measure for estimating almost everything else, thus:—

1. He quickly gets the idea of the existence of things or *substances* external to his body, because he cannot put his hand or any part of his body where any other thing is, or appears to him to be, without pushing that other thing away: and that his own body also is, in this sense, a substance, is proved to him by the fact that nothing can come or be pushed into the place occupied by his body until his body is removed from that *place* or *space.*

2. He perceives that the parts of his body are of different *size*, some being larger or smaller in comparison with others, and he notes similar differences among external things, compared with one another and with his body viewed as a measure.

3. He perceives or notes that from his body, as a centre, there are the different *directions* in which other things may

be placed or be moved, of up, down, to the right, to the left, forward, backward, &c.

4. He observes that to move any object near his body, from one place to another, he must use what he learns to call effort, or *force*, proportioned to the mass displaced.

5. He observes that different states or conditions of his body or of other things happen in succession, or one following another, as the movement of the feet in walking, the beats of a pendulum, the states of sleeping and waking, &c.; and he thus gets the notion of succession or *time*.

6. The motions or changes of place in a given time may be quick or slow, and he thus gets the idea of what he calls *velocities*.

7. He sees that he has more hands than one, and more fingers than hands; and having the ten fingers always before him, he can compare the number of any other kinds of things with that of his ten fingers; and this he is doing whenever he counts by tens, using what he is taught to call *decimal arithmetic*.

8. If he then take an ordinary human foot, or a step, or a fathom, as a standard unit or portion of length, he can *measure* or describe any other length whatever, by *counting* what number of the chosen standard that length contains.

9. In anything else, which he desires to measure or compare, he has only to fix upon a convenient portion of it, as a standard or unit, and then to ascertain the number of such units contained in different quantities of the thing. Thus he can proceed in regard to *times* by the beats of a pendulum, to *weights* by pounds or ounces, to *forces* by the weights which they can move, and so forth.

10. Then he perceives that in the world around him there are many other beings, closely resembling himself, who feel, see, hear, taste, smell, just as he does, and who recollect, think, will, and act as he does; who have pain or pleasure as he has, and whom he calls his fellow-men.

Thus does he gradually build up in his mind the edifice of his knowledge of nature, which then directs all his actions or conduct in life, as he tries to secure happiness or well-being. (See § 57 and § 58.)

Note to § 35.

Description of a gin-shop in a low quarter of the town (extracted from the 'Times' newspaper, 1860).

"In that neighbourhood, at the corner of streets or thoroughfares which he passed through, he found gin-palaces lit up like the scene of an eastern story. He had pushed open the swinging doors of one, and, peering in, beheld rags and rottenness: he heard a Babel of curses and obscenity, and saw a huddled mass of filth and wretchedness. Having pushed his way through the bloated livid creatures there, braving the stench, the smoke, and the drunken familiarities of the crowd, with the desire to know what was the absorbing allurement which drew them together, he found that they came there to drink what they called gin, a coarse, burning alcohol; and there they sat or stood about, pouring down this pernicious stuff from small metal measures, until they reeled, quarrelled, fought, and shrieked, and blasphemed. Ever and anon, as they had emptied their pockets and fulfilled their measure of drunkenness, the proprietor of the pandemonium had to thrust some of them, who were quarrelsome, into the public thoroughfare. In other parts of the world may be seen the frenzy of an African when excited by rum; the contortions of an Arab, under the influence of hashish; Malays furious from bang; Turks trembling from the effects of opium; or a Chinaman strangely emaciated from inordinate use of the drug; but for a scene of horrid vice, and lust, and filth, and frenzy, all drawn into one pit, and there fermenting, a man might search the world all over and not find a rival to 'a thriving public-house in a low, gin-drinking neighbourhood.'"

Note to § 36.

Extract from Smith's 'Wealth of Nations,' Book I., Chap. I.:—

"To take an example, therefore, from a very trifling manufacture, but one in which the division of labour has often been taken notice of, the trade of the pin-maker. A workman not educated to this business, (which the division of labour has rendered a distinct trade), not acquainted with the use of the machinery employed in it (to the invention of which the same division of labour has probably given occasion), could scarcely perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now carried on, not only the whole work is a peculiar trade, but it is divided into a number of branches, of which the greater part are likewise peculiar trades. One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head: to make the head requires two or three distinct operations; to put it on is a peculiar business; to whiten the pins is another: it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which in some manufactories are all performed by distinct hands, though in others the same man will sometimes perform two or three of them. I have seen a small manufactory of this kind where ten men only were employed, and where some of them, consequently, performed two or three distinct operations. But though they were very poor, and therefore but indifferently accommodated with the necessary machinery, they could, when they exerted themselves, make among them about twelve pounds of pins a day. There are in a pound upwards of four thousand pins of a middling size. Those ten persons, therefore, could make among them upwards of forty-eight thousand pins in a day. Each person, therefore, making a tenth part of forty-eight thousand pins, might be considered as making four thousand eight hundred pins in a day. But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day; that is, certainly not the two hundred and fortieth, perhaps not the four thousand eight hundredth, part of what they are at present capable of performing in consequence of a proper division and combination of their different operations."

Note B *to* § 36.

(This note recalls vividly the great helps to human labour which civilized man has obtained, and also the slave's notion that to work degrades man.)

Dr. Franklin, in one of his visits to England, had with him an intelligent negro servant. During a journey of inspection through the manufacturing districts of the country the servant said to him one day, "Massa, in this country, everybody, everything must work—water work, wind work, fire work, smoke work, horse work, ass work, bullock work, dog work, only de pig no work, he only eat ant sleep; de pig is de only gentleman in England."

Note to § 43.

It has been common to speak of the progress of civilization, as naturally consisting of three successive stages or states—(1) That of the *hunter savage*, houseless, roaming in the forest among the animals, which he pursues and kills for his sustenance, as the wolf or tiger does, with the difference that he may have contrived a bow and arrow or a spear to assist him. (2) That of the *shepherd* who has learned to tame some animals, as the sheep, the goat, the ox, and to multiply these under his protection so as to have within his power a constant supply of food. This state is still exhibited among the wandering Arabs, who live in tents and move about with their flocks to where, according to the seasons, grass is abundant. (3) That of the agriculturist or husbandman, who constructs a fixed residence, and who, continuing if it pleases him to hunt and to breed cattle, still trusts chiefly to the production of corn and fruits, &c., by cultivating the land to sow or plant it. The habitations may be scattered over the country or built together to form cities with innumerable conveniencies. Although these three stages have not in many countries been distinct, it may be useful to think of them in studying human progress.

Note to § 47 *and* § 48.

A free press, through such a powerful organ as the 'Times' Newspaper, produces nearly the same effects as if it were possible to call together every morning fifty thousand or more of the most intelligent of the population, to discuss in their presence all questions of great national importance. In the course of a day or two, observations on everything written in one leading paper appear like speeches from other members of a public meeting, in the other journals of the kingdom, and no important decision is come to until the reasons for and against have been fully considered by the public mind.

Note to § 53 *and* § 77.

A man who should undertake to manage a railway engine without having fair knowledge of the steam-engine and its wants, would be deemed a very foolish and rash man; but every human being has in his own living body a more complex and delicate structure to manage than any steam-engine, and few persons as yet receive better preparation than the vague knowledge communicated by defectively-trained parents. This goes far to explain the low average duration of life in ordinary society.

The Four Prime Necessaries of Life and of Noxious Agents.

In fit kind and Degree.	*In Deficiency,* or of unfit Kind.	In Excess.
1. AIR	*Suffocation* Unchanged air.	*Excess of Oxygen* in hurried breathing.
2. WARMTH	*Cold* (intense)	*Heat* (intense).
3. ALIMENT :—		
Food	*Hunger*, or bad food.	*Gluttony*, or Surfeit.
Drink	*Thirst*	*Swilling* aqueous fluid.
4. REST AFTER ACTION :—		
Of the body	*Inaction* or	*Fatigue*, or Exhaustion.
Of the mind	Ennui	*Want of Sleep*.
	Certain depressing passions, as fear, sorrow, &c.	Certain exciting passions, as anger, jealousy, &c.
In social relations	Solitude	Debauchery.

The two kinds of Noxious Agents.

1. VIOLENCE :—
   Wounds, Fractures, *Burns*, Lightning, &c.
2. POISONS :—
   Animal, *Mineral*, *Vegetable*.
   Certain of these, such as *alcohol* in its various forms, opium, tobacco, &c., which in large quantities kill instantly, when they are taken in very moderate quantity can be borne with apparent impunity, and are sometimes medicinal, but if taken beyond such moderation, producing drunkenness, &c., they become to the majority of men destructive slow poisons.
   Contagions,—as of plague, small-pox, and measles.
   Malaria of marshes, thickets, and of filth.

Note to § 60.

Extracted from the 'Elements of Physics,' vol. ii. p. 320.

Of the Eye.—' Then, further, we find that this precious organ is placed in the person, not as if by accident, anywhere, but aloft on a befitting eminence, where it becomes the glorious watch-tower of the soul; and, again, not so that to alter its direction the whole person must turn, but in the head, which on a pivot of admirable construction moves while the body is at rest; besides that, the ball of the eye itself can roll in its place, and is furnished with muscles which, as the will directs, turn it with the rapidity of lightning to sweep along the horizon, or to rise across the heavenly concave; then is the delicate orb secured in a strong socket of bone, over which is placed the arched and padded eyebrow, as a cushion to lessen the shock of accidental blows, and with its fine hairs, inclined to turn aside any descending perspiration or other moisture which might incommode; then is there the soft and pliant eyelid with its beauteous eyelash incessantly wiping the polished surface and spreading over it the pure moisture poured out from the lachrymal glands above, of which moisture the superabundance passes to the nostril, there to maintain necessary sensibility, and to be then evaporated by the current of the breath. Then, further, it is to be noted, that instead of there being only one so precious organ there are two, lest one by accident should be disabled, and which two have so entire a sympathy that they act together as only one more perfect. Then the sight continues equally perfect through the period of growth to maturity, although because the eye then increases in size the relative magnitudes have to maintain their due proportions; and the pure liquid which fills the eyeball, if rendered turbid by any accident, is by the actions of life gradually restored to perfect transparency, although its source is the thick red blood. The mind which can suppose or admit that, within any extent of time one single such apparatus of vision could have been produced by accident, that is, without design, must surely be singularly constituted, or must have received a morbid bias in education; but the mind which can still further admit that the millions of human eyes which now exist on earth, all equally perfect, can have sprung from accident, and that the millions of millions of eyes in other animals, each adjusted to the peculiar nature and circumstances of the creature which bears it, can be accident;—the mind which can admit this must have its highest faculties either benumbed or totally wanting."

Note to § 63.

Extracts from Bishop Butler's 'Analogy of Natural and Revealed Religion,' Part ii. Chap. i.:—

"For though natural religion is the foundation and principal part of Christianity, it is not in any sense the whole of it."

"Christianity is a republication of natural religion in its genuine simplicity." (He had spoken of the superstitions engrafted upon it among ignorant nations.)

"The Law of Moses and the Gospel of Christ are authoritative publications of the religion of nature."

Lord Bacon calls natural theology "the key of revelation."

Dr. South (of high authority among English divines), speaking of morality, says: "He that is a good man is three quarters of the way towards being a good Christian, wherever he lives and whatever he is called."

Note to § 64.

Modern books have presented the following rough estimate of the population of the world classed in relation to the religions professed by them.

	MILLIONS.	MILLIONS.
Inhabitants of the globe		1,000
Buddhists, including the Chinese, who alone are 360 millions, and Hindoos .. .. about	500	
Mahometans in Asia, Africa, and Europe .. .. „	240	
Christians .. .. „	260	
		1,000

Of Christians there are—

In connection with Rome .. about	130
Of the Greek Church .. .. „	65
Of Protestants	55
	250

Of Protestants there are many conflicting denominations.

Of the population of the British Isles, a late Review has given the following estimate :—

The inhabitants about 30 millions.

	MILLIONS.		
Presbyterians, chiefly Scotch	3	10	
Roman Catholics	7		
Church of England and various Dissenters .		20	
			30

(The 'Quarterly Review' for April, 1861, page 442, states that in England systematic Nonconformity "now comprises at least one third of the entire population.")

A more elaborate estimate has lately been published by M. Dietrici, Director of the Office of Statistics at Berlin. The chief points of difference are, that he puts

	MILLIONS.
The total number of inhabitants at nearly ..	1200

	MILLIONS.	
Caucasians	360	
Mongols	552	
Ethiopians	196	
Malays	60	
American Indians	1	
		1169 millions.

Of Christians :—		MILLIONS.	
Roman Catholic	.. ..	170	
Protestant ..	.. ..	80	
Greek Church	.. ..	76	
		—–	326 millions.

Note to § 65.

It must be gratifying to Englishmen to reflect that among the valuable lessons in legislation, which the world acknowledges to have received in late times from England, promotive of national prosperity and happiness, there have been some important ones of religious toleration, the virtue said to be, of all, the hardest to learn and to practise. How much had to be done in this respect, only a short time ago, it is painful now to recall. Any one who desires to read details that he may judge of the amount gained, will find them in the common histories, or as shortly sketched by the Rev. Sydney Smith, afterwards canon of St. Paul's, in a paper in the 'Edinburgh Review' of 1808, advocating Catholic Emancipation. Britons may now put the question, without fearing the reply, "Where else than in the British Isles have changes of such momentous importance been brought about in so short a time, bearing both on civil and religious liberty?" Among these are the abolition of the penal laws in Ireland, and of the test and corporation acts against other nonconformists or dissenters in England; the abolition of slavery in all the British colonies and dependencies; parliamentary reform; free trade; improvements in the education of the people by new schools and universities open to students of all religious denominations; and, of late, scarcely a session of parliament has passed without some addition being made to the list of good measures. One of these, of great value, although the zealous leaders of opposing creeds do not yet approve it, was the establishment in Ireland of the National Schools, and the Queen's Colleges, to which the young of all religious denominations have equal right of admission, and where may be taught everything deemed useful in a civilized community, except the peculiarities of religious doctrine with which it is the special office of the clergy to deal. It is now becoming more and more evident that to have only denominational schools of discordant creeds for general education, is to stereotype or render permanent, as far as human device can do so, all religious differences, and therefore necessarily to perpetuate numerous errors.

The writer of this has strong conviction of the importance of such mixed schools, from his own experience, during his education in Scotland early in this century. The disruption of the Established Church there had not then taken place, and there was no activity of sectarian strife. Whatever the strict rule of law might be, the grammar-school (at which Lord Byron happened to be then a pupil) and the University of Aberdeen practically received students of all classes, without reference to the creeds of their parents. The consequence was, that many congenial minds were drawn together, and warm friendships were formed which remained afterwards unbroken, notwithstanding differences of religious denomination. Among the students were members of the Established or Presbyterian Church of Scotland, of the Church of England, and of the Roman Catholic Church. The writer had dear friends and relatives in all of these. Under such circumstances, ordinary sectarian animosities could not arise, and permanent benign effects on character were produced on all sides. When the writer afterwards completed his professional studies in London, and had been appointed chief medical officer of an East India Company's ship, which on that occasion had to convey troops to India, the accidents of a protracted and peculiarly eventful voyage carried him from Europe to parts in the other three quarters of the world, as Brazil, Cape of Good Hope, and various stations in Asia, including China. He had thus experience, still larger than before, of differences of religious training, bringing under notice, besides denominations of Christians, also Hindoos, Buddhists, and Mahometans; and owing to considerable detention in various places he had the opportunity of studying the effects on character. It was interesting to observe among all classes the earnestness of individuals in their different creeds, who would doubtless have made great sacrifices to perform what they had been taught to deem their duty to their Maker. On his return to London, to reside permanently, he had yet further experience of the same kind, when his appointment as physician to the French and Spanish Embassies gave him opportunities of knowing intimately men of superior intellect, who had been otherwise trained than people are in England. Had he been asked to state reasons why, if placed from infancy exactly as some of these had been, he would have believed and acted otherwise than as they were doing, he must have replied that he could not. With such education and experience of the world as fell to his lot, the writer thinks it impossible that an ordinary mind could have conceived sectarian hatred against any persons honestly following the lessons taught by the parents whom it had pleased Providence to give them as their guardians and instructors. The National Schools in Ireland commence such an education; and the effects of the increasing freedom of commerce over the world, aided by railways, steam navigation, and the electric telegraph, by opening all nations to friendly intercourse with one another, must render more efficacious the Divine precepts "Love one another," and "Do to others as you would be done unto."

Note to § 94.

The necessity of studying the three fundamental physical sciences of natural philosophy, chemistry, and physiology, in their natural order here adopted, is explained fully in the sections 22, 23, 24, and 68, which should now be read again. But this necessity has often been overlooked, to the great loss of the students. An additional reason why the study should begin by natural philosophy is, that very many of the facts to be explained are already familiarly known to everybody, and the student who begins well is strongly drawn to persevere to the end. Then the student, having become aware of the singular power and utility of knowing scientific principles, is attracted to the other branches of chemistry and physiology, which mainly rest on mechanics, for he finds that, by having learned mechanics or physics, he already knows important parts of the others. By completing the course of these fundamental sciences, the student is fitly prepared to prosecute the study of any of the scientific arts which is to become his employment for life.

The connection of natural philosophy with medicine is shown in Note A, § 94. The steam engine illustrates the united agency of mechanical and chemical laws--B, § 94. And the comparison of a working steam engine with a living animal exhibits the union of the three sets of laws, mechanics, chemistry, and life—C, § 94.

It was the author's conviction respecting the singular importance of natural philosophy as a beginning of scientific study which gave occasion to his addressing the letter copied below, Note D, § 94, to the chief magistrate of Aberdeen, in June, 1859. The change which he apprehended was ordered by the University Royal Commission, then acting, and the object sought remains therefore to be effected in some other way.

Note A *to* § 94.

From the 'Elements of Physics.' Introduction.

Animal Mechanics.

"Physics is also an important foundation of the healing art. The medical man, indeed, is the engineer pre-eminently; for in the animal body true perfection and singular variety of mechanism are found. Where to illustrate *mechanics* is to be seen a system of levers and hinges, and moving parts, like the limbs of an animal body; where such an hydraulic apparatus as in the heart and blood-vessels, such a *pneumatic* apparatus as in the breathing chest; such acoustic instruments as in the ear and larynx; such an optical instrument as in the eye; in a word, such variety and perfection as in the whole of the visible anatomy? All these structures the medical man must understand as a watchmaker knows the parts of a timepiece which he is employed to repair."

Note B *to* § 94.

Extract from the 'Elements of Physics.'

"The fertile genius of James Watt did not stop at the accomplishment of the two or three important particulars described above, but throughout the whole detail of the component parts, and of the various applications of the engine, he contrived miracles of simplicity and usefulness. We should exceed the prescribed bounds of this work by entering more minutely into the subject; but we may remark that, in the present perfect state of the engine, as applied to particular purposes, it appears a thing almost endowed with intelligence. It regulates with perfect accuracy and uniformity the number of its strokes in a given time, counting or recording them, moreover, to tell how much work it has done, as the hands of a clock tell the number of beats of its pendulum; it regulates the quantity of steam admitted to work, the briskness of the fire, the supply of water to the boiler, the supply of coals to the fire; it opens and shuts its valves with absolute precision as to time and manner; it oils its joints; it takes out any air which may accidentally enter into parts which should be vacuous; and when anything goes wrong which it cannot of itself rectify, it can be made to warn its attendants by ringing a bell. Yet with all these talents and qualities, even when exerting the force of hundreds of horses, the strength of a child could arrest it: its aliment is coal, wood, charcoal, or other combustible; it consumes none while idle; it never tires, and wants no sleep; it is not subject to malady when originally well made, and only refuses to work when worn out with age. It is equally active in all climates, and will do work of any kind; it is a water-pumper, a miner, a sailor, a cotton-spinner, a weaver, a blacksmith, a miller, &c., &c.; and a single small engine in the character of a steam-pony, may be seen dragging after it on a railroad a hundred tons of merchandize, or a regiment of soldiers, with thrice the speed of the fleetest mail-coaches of former times. It is the king of machines, and a permanent realization of the genii of Eastern fable, represented as occasionally exhibiting miraculous powers in the service of man."

Note C *to* § 94.

James Watt, when devising his great engine, knew well that the rapid combination of the oxygen of atmospheric air with the combustible fuel in the furnace, produced the heat and force of the engine; but he did not know that in living bodies there is going on, only more slowly, a similar combination of the oxygen of the air with the like combustible matter in the food, as this circulates after digestion in the form of blood through the lungs, which combination produces the warmth and force of the living animal. The chief resemblances of the two objects are exhibited strikingly in the following table of comparison, where, in two adjoining columns, are set forth nearly the same things and actions, with difference only in the names :—

The steam-engine in action takes—	*The animal body in life takes—*
1. Fuel, viz., coal and wood, both being old or dry vegetable matter, and both combustible.	1. Food, viz., recent or fresh vegetable matter and flesh, both being of kindred composition, and both combustible.
2. Water.	2. Drink (essentially water).
3. Air.	3. Breath (common air).
And produces—	*And produces—*
4. Steady boiling heat of 212 degrees by quick combustion.	4. Steady animal heat of 98 degrees by slow combustion.
5. Smoke from the chimney, or air loaded with carbonic acid and vapour.	5. Foul breath from the windpipe, or air loaded with carbonic acid and vapour.
6. Ashes, part of the fuel which does not burn.	6. Animal refuse, part of the food which does not burn.
7. Motive force, of simple alternate push and pull in the piston, which, acting through levers, joints, bands, &c., does work of endless variety.	7. Motive force, of simple alternate contraction and relaxation in the muscles, which, acting through the levers, joints, tendons, &c., of the limbs, does work of endless variety.
8. A deficiency of fuel, water, or air, first disturbs, and then stops the motion.	8. A deficiency of food, drink, or breath, first disturbs, and then stops the motion and the life.
9. Local damage from violence in a machine is repaired by the maker.	9. Local hurt or disease in a living body is repaired or cured by the action of internal vital powers given by the Creator.

Note D *to* § 94.

"London, 15th June, 1859.

"My dear Sir,

"When you were last in town I made efforts to see you, but without success. I desired to converse with you on a design which I had long entertained in regard to my old Alma Mater, the Marischal College in Aberdeen. It is natural to feel regard for the school in which we have received useful knowledge. I wished to testify that feeling towards Marischal College, and in a way that might be useful to future students there.

"I had early become convinced that a more careful and special study of Natural Philosophy than had yet been followed anywhere by students of Medicine was essential to high proficiency in their art, and that in regard to other persons also who seek a good or liberal education the same department of knowledge is very important; for every day is showing more and more that the advancing civilization of the world is closely connected with engineering skill, of which Natural Philosophy is the chief foundation.

"It appears to me, therefore, that if I invest a thousand pounds (or more if required) to increase the income or means of the Professor of Natural Philosophy in the Marischal College, so as to enable him to give more extended illustrations of his subjects to medical students, and to offer to young persons generally in Aberdeen, at a very moderate charge, in evening lectures or otherwise, the kind of information to which I refer, I shall be aiding a useful work not unlikely to be repeated elsewhere.

"I have been lately led to fear, however, that changes threatened in the College arrangements at Aberdeen, among which I am told is contemplated the removal of the Chair of Natural Philosophy to the Old Town, and therefore to a distance from many of those whose advantage I had in view, may interfere with my design. May I then request that you, who are now the chief magistrate of the city, watching over its interests, will cause to be sent to me any information on the subject which you think I should possess?

"I remain, my dear Sir,
Yours, &c.
"N. A.

"To John Webster, Esq.,
Lord Provost of Aberdeen."

Note E *to* § 94.

The last of the four fundamental sciences as they stand in the text is that of the Mind. The laws of mind, although often unconsciously, are practically known as laws to a certain extent by all persons, and in the common concerns of life are by many judiciously obeyed. But the science of mind has not been studied methodically by people in general, chiefly because of the terrifying names of metaphysics, psychology, ideology, and so forth, given to it by various authors, under which titles many very unprofitable books have been written. Mental science is really the most precious of the four, for it is the guide to the complete knowledge of the other sciences and to wise conduct through life. This little work has sought its aid in the attempt to convey fundamental instruction regarding the universe. There are many people who speak their mother tongue passably well without having studied the grammar otherwise than by silent reflection on their own experience, and there are many who swim well without having studied formally the laws of hydrostatics; and many who reason with great acuteness without having studied technical logic, or the scientific phraseology used in discoursing on the mental faculties; but with respect to all the sciences, clear knowledge of the fundamental laws confers marvellous increase of power for new and higher purposes. Such knowledge of mind, therefore, should be part of general education. A very simple and satisfactory method of studying mental science is to take it along with the philosophy of language as referred to in § 75. Excellent remarks on this subject are contained in the little work of Professor Jardine of Glasgow, entitled 'Outlines of Philosophical Education,' published in 1796.

Note A *to* § 95.

University was the name first used seven centuries ago for the higher schools then beginning to be established in Europe, which were intended to complete a course of mental training or education in universal knowledge. At that time, however, true physical knowledge now bearing the names of *Mechanics*, *Chemistry*, and *Biology*, had scarcely begun to exist. Tycho Brahe, Kepler, Galileo, Newton, had not yet appeared; and the curriculum of studies in a university could not include the subjects which these and innumerable worthy followers, particularly within the three last centuries, have added to the list, and which have so marvellously advanced the condition of mankind on earth. The deep learning of the remote time was supposed to be related only to Divinity, Law, and Medicine, with parts of Psychology; and these were the Faculties which occupied the attention of university students. Then, as nearly all that could be learned on these subjects was contained in Greek and Latin books, the first step of a higher education was to master the Greek and Latin languages—a most laborious and costly task. This gave a character to the proceedings of all the universities which nothing can indicate more strikingly than that the two ancient universities of England, of Oxford and Cambridge, and which were the only two until within thirty years, have continued until very lately to bestow all their honours and prizes on proficiency in knowledge of the Greek and Latin classics, and in the higher mathematics, neither of which are knowledge of nature, but means or instruments of acquiring and storing that. In 1835, the University of London was founded "for the advancement of religion and morality, and the promotion of useful knowledge." The Senate of twenty-four Members chosen by the Government, of which number the writer of this had the honour to be one, had to frame their regulations under very different circumstances from what existed when Oxford and Cambridge were founded; and they saw the necessity for including in the curriculum of study for candidates who might aspire to the honour of their academical degrees, a very different arrangement of subjects from what had been deemed suitable of old. They accordingly did require a certain amount of acquaintance with the four great departments of science which now rule the affairs of the civilized world. As was to be expected, this at first appeared unreasonable to many of those trained in the former system, for it was said, the limited capacity of the human mind is unequal to the task of learning so much. The views of enlightened men are now, however, greatly changed, and with most beneficial results for the general welfare. The courses of study almost everywhere are being changed to answer the requirements of society as it now exists, as is made manifest in the examination papers for the competitive examinations now to be undergone, for admission into the departments of the public service, civil and military, and all the schools and educational establishments, which prepare candidates for these examinations, have to shape their courses of study accordingly.

Three years ago, the Members of the Senate of the University of London were impressed with the belief that a very useful direction to general studies would be given by their instituting a new degree in Science to rank with the academical degrees already in existence of Bachelor, Doctor, and Master in Arts, Laws, Physic, and Divinity. They were powerfully aided in their scheme by opinions in favour of it expressed in two memorials addressed to them by the Presidents and leading Members of all the great scientific bodies—the Royal Society, the Chemical, Astronomical, Geological, Botanical, &c. The new degrees have been instituted, as seen in the regulations published in the Calendar of the University.

Note B *to* § 95.

OUTLINE SCHEME OF A COMPLETE SCIENTIFIC EDUCATION, AND THEREFORE A CURRICULUM OF STUDIES FOR CANDIDATES DESIRING ACADEMICAL DEGREES IN SCIENCE.

There should be established the two Degrees of Bachelor and Doctor of Science—B.Sc. and D.Sc.

The curriculum as to the subjects, order, and extent of study, to be grounded on the three considerations—1st, That

1. *Language*, and
2. *Mathematics*

are the two means or instruments by which accurate or scientific knowledge of nature can be acquired and stored and communicated; 2ndly, that all the objects of nature are conveniently classified as belonging to the three kingdoms called the

1. *Mineral*, or inorganic,
2. *Vegetable*, } or organic,
3. *Animal*, }

and 3rdly, that there are four fundamental divisions of Science, called—

1. *Natural Philosophy* (or Physics),
2. *Chemistry*,
3. *Biology* (or Physiology),
4. *Psychology* (or Philosophy of Mind);

which four furnish explanation of all the phænomena in other complex departments of knowledge, often also called mixed Sciences, as *Astronomy*, *Geology*, *Meteorology*, *Engineering*, *Navigation*,* &c., which four divisions have such mutual dependencies that they can be properly studied only in the order here set forth.

To test whether a Candidate has followed the curriculum and attained the required proficiency, there may be four Examinations, distant at least a year from one another.

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* See Note C to § 95.

1. *Of Matriculation.*—To include
   Languages and Elementary Mathematics.
   Simple Elements in the first three fundamental divisions, *Physics*, *Chemistry*, and *Biology*, with some illustrative facts.
2. First Examination for B.Sc.
   Mathematics to a higher grade.
   Physics, Chemistry, and Biology in more advanced degrees, with illustrations from Nature and Art.
3. Second and Pass Examination for B.Sc.
   The subjects of the last Examination more mathematically treated, and with greater variety of illustration.
   Psychology, or Logic and Moral Philosophy.
4. Examination for Doctor Sc.—D.Sc.
   To test general knowledge of the fundamental departments, and special thorough knowledge in some group of subjects chosen by the candidate from a list submitted to him.

Note C *to* § 95. (Supplementary to Note A.)

There are only the four fundamental sciences above named—Natural Philosophy, Chemistry, Life or Biology, and Mind. All the other so-called sciences are composed of these, as Medicine, Navigation, Meteorology, Geology, &c. Taking geology, for instance, we see that from Natural Philosophy is obtained the explanation of the globular form of the earth, the bulging at the equator, and the flattening near the poles; the tides and winds, the flow of rivers, the various motions of the globe, the deposition of strata, the formation of snow and glaciers, &c. Chemistry explains the composition of rocks and soils, the conversion of organic bodies into petrifactions, the gases of mines, subterranean explosions, nature of mineral waters, &c. The laws of life explain many of the facts connected with fossil remains, guano deposits, manures, &c. And the laws of mind and instincts explain many important facts proving human and animal agency in remote past time, as remains of ancient mines, harbours, cities, and so forth.

Note A *to* § 101.

Some of the remarks made in these pages on the practice in English schools and universities of limiting too much the attention of students to Greek and Latin literature, while other subjects more important in modern civilization are excluded, are not stronger than have been urged by many distinguished men who have been themselves partly trained in these institutions. The writer, while allowing the vast importance of these classical studies in times gone by, and their utility still as lessons in style, and as facilitating the acquisition of modern languages, yet holds with Milton, who had himself been a schoolmaster, that by a better method of study than has generally been used in the schools more Greek and Latin might be taught in one year than is now learned by the bulk of scholars in five or six years;* and he believes that improved school-methods will secure the advantages sought by the erroneous system, combined with those of the more comprehensive plan. It is a noticeable fact, that Shakspeare, whose works are among the glories of England, and of humanity, could not, in the grammar-school sense of the words, be called a profound scholar, for his contemporary, Ben Jonson, spoke the common belief when saying of him that he "had small Latin and less Greek;" and it is known that he used freely existing translations from the Greek.

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* Extract from Milton's letter on Education to Mr. Hartlib: "We do amiss to spend seven or eight years merely in scraping together so much miserable Latin and Greek as might be learned otherwise easily and delightfully in one year."

Note B *to* § 101.

One advantage of public schools, such as exist in England, is, that they teach in a degree, *practical* dealing with the world. A great school is the world in miniature, where youths see exemplified on a narrow scale, and when lessons are not so costly to them as they might be in their future life, nearly all the tendencies to actions good and bad which constitute the activity of the external world. A young man entering the world with honesty in his own character, but ignorant of the tricks of dishonesty common in present societies, might quickly be the dupe of designing knaves. And while war is going on in the world a portion of every community must be prepared for defence, or even for active precautionary aggression.

Note C *to* § 101.

There are here to be noticed some important popular misconceptions connected with the terms *Fundamental* and *Superficial Knowledge*. If a person had to study, with the assistance of a map, the geography of the British Isles, he would first observe generally that England was in the south, Scotland in the north, and Ireland in the west; and he would remark the general shape and magnitude of each. He might then observe the position of the capitals in each, London, Edinburgh, Dublin; and afterwards the chief rivers, mountain groups, and so forth; and he would soon be able, from memory, to sketch on a fresh sheet of paper all such important features. He would then possess what might be called a considerable amount of correct fundamental or general knowledge of British geography, to which he would afterwards add knowledge of the details of the town or neighbourhood in which he lived. If another student sought to know, first and only, the details connected with his own locality, as the streets, squares, names of the inhabitants, &c., but got no clear idea of where Dublin, Edinburgh, York, &c. were, his education would be shockingly defective, although he might be able to answer more questions respecting localities than the person first described. Now what would be true of the second student of geography is strikingly true of many students of supposed useful knowledge, who have been told that the most important principle of a liberal education is to study *one* subject deeply or completely. A pilot intending to undertake the guidance of ships through a rocky channel, would err in principle if he studied all that concerned one or two rocks there, but little respecting others equally dangerous. Erasmus, the great classical scholar of the sixteenth century, said that a person could more easily acquire knowledge enough of the three learned faculties of law, physic, and divinity, to entitle him to the degree of doctor in each, than to make himself master of a good style in Latin composition—which accomplishment has been for centuries past a chief object of ambition in the public schools and universities of England.

Note to § 103.

Recollecting what glorious examples for so early a time, of all kinds of human excellence, as philosophers, orators, historians, poets, artists, statesmen, generals, physicians, &c., were produced in Ancient Greece, and produced necessarily under the system of educational training which there obtained, one would expect to profit by inquiring what that system was. Now we know that the Greeks in their schools and academies had nothing to teach or to learn but nature and their mother-tongue: the word nature here implying the leading facts in natural history, science, and art, as then known, and especially what regarded man himself. They had no "learned languages," and little of "mathematics," which two branches in England have by many been considered the sum and substance of a liberal education. Indeed, the Greeks knew nothing of the older languages from which their own had been formed, and in the brightest days of the country, Euclid had yet to come. They escaped, therefore, the misfortune under which the youths of modern Europe have long laboured, of being doomed to spend a great part of their early years, during which the knowledge of the universe, essential to man's well-being, should be obtained, in the study of dead languages, all the books written in which, on parts of progressive science, are becoming every day more and more inferior to the works of modern times, written in the now admirable languages of the countries which produce them. And while the modern languages, for the solid purposes of science, are necessarily more complete than any that existed of old—even for the lighter purposes of poetry and graceful literature, when the words flow from the inspiration of a Dante, a Shakspeare, or a Goethe, they are to those who understand them as sweet and expressive as ever the Greek language was to the ear or imagination of a Greek.

Note to § 111.

Extract from the paper of the Rev. Barham Zincke, in the Transactions, for 1859, of the National Society for the Promotion of Social Science.

"It is curious that much the same state of feeling and practice is observable in the educated classes themselves, as respects our highest education—that offered by our universities. The gentry, together with the monied and professional classes, have increased to numbers that a generation or two back might have been thought impossible. A very large portion of the youth of these, *par excellence*, the educated classes, ought, one might suppose, to be found in our universities. They value education highly, and are ready to make the greatest sacrifices to secure the best education for their children. With the youth, therefore, of these classes our universities ought to be overflowing. We all know the very reverse of this is the fact. I live in the neighbourhood of a strictly agricultural town, the capital of an agricultural county, but of its population, amounting now to more than 40,000 souls, I am not aware that a single individual, with the exception of the clergy, received a university education. Probably the educated classes of the enterprising manufacturing town, in which we are now assembled, show the same practical disregard of our universities. In fact, this disregard has now become so wide-spread, that if the bishops were to withdraw the rule they generally act upon, in requiring from candidates for holy orders certificates which imply a university education, our universities would literally collapse from want of students. To this practice of the bishops, and to the hope of obtaining a fellowship, not to the general desire of the educated classes to secure for their sons a university education, the ancient universities of this wealthy country at present owe their very existence as places of education. Every year the proportion of the members of the two Houses of Parliament, of the bar, and of the gentry, that receive a university education, decreases. The fact is patent to all, that the universities have lost the hold they once had on the educated classes.

"An Oxford man myself, I am not unacquainted with what has been done for them, and by themselves, of late, but I am persuaded that the great paramount mistakes of their system remain untouched. The reforms that have been carried out will never recover them from their present paralysis, because they do not bear in the least upon its causes. The universities have come to be neglected by the educated classes for two reasons mainly: one is, as I have already noticed, that the time they exact from the student is in these days too valuable to be given in exchange, even for the particular benefits they desire to confer, though there is more or less chance in each case of their not being able to confer them. The other reason is, that the fields of knowledge, and all the intellectual wants of society, have in course of time been so multiplied, and have become so various, that a purely literary and theological education is now suitable, if to any, only to a small proportion of the upper classes. We abstain from sending our sons to the universities, because they have not accommodated their system to these facts. If, therefore, they would regain their former hold upon us, they must attempt it in the following way:—For all the branches of knowledge they must obtain the ablest instructors. This must be done at any cost, and the cost will be considerable. They must also again admit students at any age, as low as fifteen or sixteen, as was formerly the practice. No one must be compelled to study anything but what he himself desires to study. Degrees must be inexorably withheld from incompetency, and again made to represent what they profess, that is, a serviceable mastery of the different branches of study to which they are respectively assigned; as, for instance, of law and history, or of physics and mathematics, or of the medical sciences, or of polite learning, or of divinity. This would, of course, render unnecessary, and indeed quite inapplicable, the present system of honours. On the Continent, as well as in this country, and so also in the United States of America, we hear it said that the day for universities has gone by. The truer remark, I conceive, would be, that the old university system is not at all adapted to the existing state of things."

Note to § 112.

HAPPINESS.

Sources of Pleasure and Pain.

Man is susceptible of two opposite kinds of sensation, which he calls *pleasure* and *pain*. By his nature he desires and exerts his faculties to obtain and prolong the first, to shorten and avoid the other.

To have many pleasures and few pains is called a state of happiness; to have the contrary, is called a state of suffering or misery. To secure happiness, therefore, is the aim of man's conduct through life.

As a lamp must be supplied with oil to keep it alight, so must the body of man be regularly supplied with four essentials to maintain its life. The four are, as explained in § 12, and in the note to § 77, (1) *fit air*, (2) *warmth*, (3) *aliment*, (4) and *rest after action*; and these are called, therefore, the four prime necessaries of life.

Providence has ordained that to possess and to use aright the four prime necessaries is productive of great pleasure to the individual, and is maintaining health and prolonging life; and that the want not satisfied, produces great pain, soon becoming intolerable, and ending in death; the same fatal effects also following quickly from the hurtful agencies of poisons and violence. There is thus a double security for the preservation of life and health in the pleasure from having, and the pain from wanting, the prime necessaries.

The four necessaries above mentioned which directly affect the senses are called prime necessaries of life, and the pleasures and pains connected with them, including the pains connected with the two kinds of directly hurtful agencies, are called the prime pleasures and pains.

Because man has the mental capacity of learning the laws or course of nature, he soon foresees that certain things and occurrences will be followed by certain others; and, therefore, that the possession or command of certain of the former as means, would give him the power of having the prime necessaries of life whenever wanted. Such means are—property accumulated to a certain degree, or wealth, knowledge, gainful employment, friends, or the esteem of others, good government, confidence in the favour of heaven, &c. His exertions, therefore, are made to obtain enough of these, to be assured that he will command through life all things needful, and will be protected against possible evils; and he will prosper by practising the conduct described in § 89. He will then have no need to think but of pleasing things, and will so far be happy. A mind occupied with thoughts of pains, and particularly if they threaten self in the future, is unhappy. The pleasures and pains spoken of in this paragraph are called mental, to distinguish them from the prime pleasures and pains of the senses. As they may concern lengthened periods, they may far exceed in importance almost any actual prime of short duration, and they will correspondingly influence conduct.

From man's faculty of conceiving so clearly as he does the course of nature, if any fellow-being is seen or is described to be enjoying or suffering under known circumstances, the observer has such vivid conception of what must be passing in the mind of the other person, that he, to a certain degree, shares in the joy or suffering, and is said to have fellow-feeling or sympathy. The degree of this depends partly on the natural sensibility of the person, and is generally proportioned, also, to the degree of relationship between the parties, as being members of the family, friends, neighbours, of the same country, or of the human race; and even if an unreal case of joy or suffering be brought home very vividly to the sympathizing mind, the effect is intense, as seen in the effects on the reader, of a good novel or fiction, or on a spectator of a touching drama. Many members of society who have not fixed duties to perform, as in earning their livelihood or otherwise, can by reading history, travels, novels, &c., identify themselves for the time so completely with the characters portrayed, as almost to forget their own personality. And it is true of many active, benevolent individuals in society, that a great part of their pleasures and anxieties are really the share or sympathy which they take in the affairs of others.

The SCIENCE of Happiness;—or, Classification of its Sources.

1. The possessing and duly using the four prime necessaries of life, set forth in § 12, and in the note to § 77.

2. Having securities for the continued command of these necessaries through future time by possessing means which give them; of which the chief are—

Some property.
Health.
Knowledge.
Power.
Esteem of others.
Good government.
Trust in the favour of Heaven.

3. Having vivid fellow-feeling, or sympathy with others in their pleasures and pains, inducing conduct which may increase the pleasures and mitigate the pains.

4. Early formation of good habits and of agreeable associations of thought.

5. Cultivation of the mind in regard to seeing the fitness of nature to afford delight to man (§ 61) aided by the fine arts. The exquisite pleasure which many persons have in the contemplation of nature, and the fitness of this world in numerous ways to render men happy, forms a large proportion of the enjoyment of many individuals.

6. Constant exercise of the faculties in the pursuit of good ends—instead of idleness.

The ART of Happiness;—or, How it is to be Secured.

After the sources of pleasure and pain, as above arranged, are known, a person still requires some rules for extracting from these the greatest amount of happiness which his or her circumstances or position in the world will allow. The following five words or phrases, if kept constantly present to the mind, are effectual reminders and good counsellors:—

1. *Temperance*—or moderation in all things.
2. *Activity*—Habitually exerting the powers of mind and body for good purposes.
3. *Justice* in all its forms.
4. *Benevolence* towards others.
5. Reliance on the goodness and other attributes of the Creator, with obedience to what is discovered to be His will.

It is evident that these words or lines are merely titles of extensive chapters which would be required to treat the subjects fully.

Virtue is a word expressing observance in conduct of the rules given above.

Vice designates the conduct which breaks these rules.

Duty designates the conduct which persons must follow not to deserve punishment.

Many tables of the *virtues* have been framed, all more or less resembling. The following were the rules which Franklin laid down for the discipline of his life:—

Temperance.	Eat not to fulness; drink not to elevation.
Order . .	Let all things have their places; let each part of your business have its time.
Resolution .	Resolve to perform what you ought; perform without fail what you resolve.
Frugality .	Make no expense, but to do good to others or yourself, that is, waste nothing.

Industry .	Lose no time; be always employed in something useful; cut off all unnecessary actions.
Sincerity .	Use no hurtful deceit; think innocently and justly; and if you speak, speak accordingly.
Justice . .	Wrong none by doing injuries, or omitting the benefits that are your duty.
Moderation.	Avoid extremes; forbear resenting injuries.
Cleanliness.	Suffer no uncleanliness in body, clothes, or habitation.
Tranquillity.	Be not disturbed about trifles, or at accidents common or unavoidable.
Humility .	Imitate Jesus Christ.

If the science and art of Happiness are as intelligible as here appears, the question may naturally be put, why there is so much unhappiness in the world? There are many reasons, and among them are the following:—

1. To teach this science and art is not a part of general systematic education; and of the persons left ignorant many fall into the error of pursuing single objects as the sole or chief sources of well-being, instead of seeking a well-proportioned union of many, and they soon become the blind slaves to such passions as avarice, ambition, sensual indulgences, and so forth.

2. Every one of the multitude of religious beliefs or sects is represented by the teachers of it as the only true source of happiness; and the differences among the sects proving that a great majority of the teachers must be in error, religious teaching is rendered much less efficacious and useful than it might be, and than it will be when harmony of opinion shall be established.

3. There is, because of imperfect education, much evil example in the world, proving the general weakness of the belief in the undoubted truth that "honesty is the best policy," and lessening the hope of the young that they will be able to act up to the good rules which so many disobey.

4. Many people erroneously believe certain evil propensities to be irresistible, and certain evil habits, when formed, to be incorrigible.

From what has been said in this chapter and throughout the volume, it appears that the arts which secure in this world health, wealth, longevity, friendships, and religious consolation, or, in general, whatever contributes to produce happiness are not, as many persons suppose, different arts, sometimes even conflicting among themselves, but when fully analyzed, are found to consist all of so nearly the same elements, that they may be considered as forming but one great and harmonious whole, fitly designated *The Art of Happiness.* Providence has willed that this shall be attainable in all ranks of society; but in the present stage of progressive civilization it is perhaps more frequently found among persons of the middle classes than among those placed either very high or very low.

Note to § 114.

Extract from Macaulay's masterly sketch of the progress of England subsequently to the Norman Invasion in 1066.

"In the course of seven centuries the wretched and degraded race have become the greatest and most highly civilized people that ever the world saw; have spread their dominion over every quarter of the globe; have scattered the seeds of mighty empires and republics over vast continents, of which no dim intimation had ever reached Ptolemy or Strabo; have created a maritime power which would annihilate in a quarter of an hour the navies of Tyre, Athens, Carthage, Venice, and Genoa together; have carried the science of healing, the means of locomotion and correspondence, every mechanical art, every manufacture, everything that promotes the convenience of life, to a perfection which our ancestors would have thought magical; have produced a literature which may boast of works not inferior to the noblest which Greece has bequeathed to us; have discovered the laws which regulate the motions of the heavenly bodies; have speculated with exquisite subtlety on the operations of the human mind; have been the acknowledged leaders of the human race in the career of political improvement." "We have said that the history of England is the history of progress."

Note 117—*to* § 25.

On the other hand, no one doubts that a person sitting near an open barrel of gunpowder, and who sees a thoughtless child, with a burning stick in his hand, running towards it, could, if he so willed, continue sitting, although sure to be blown into the air the next moment; but, if he be of sound mind, his love of life will induce him to dart forward instantly to arrest the child, and so to avert the threatened catastrophe.

Note 118 A—*to* § 50.

One popular misconception or fallacy, and which is fruitful of many others, is this, that the so-called operatives or workers for wages in any society really do all the work there, while the so-called owners, or proprietors, or capitalists live uselessly at ease, supported by the industry of the workers. Now it would be just as true to say, that if the maker or proprietor of a fishing-net, which had cost weeks or months of labour, were to hire a man to use the net for a day, and in the evening had as his gain a basketful of fish; it would be as true to say that the hired working fisherman was the sole producer of that gain. The fisherman evidently did but a small fraction of the work performed — namely, the labour of only a few hours, to be added to that of weeks or months by the owner. If the fisherman, therefore, were paid as much wages for his day's work as other equally good workmen in other trades were able to earn, and were glad to receive, he would have his just reward.

Now almost every employment or kind of work in a civilized community is labour of a kindred nature performed for wages with implements, machinery, or means previously prepared, and owned by others, and which must have cost the wages which had supported the producers with families, all of which past outlay has to be repaid from the ultimate profits of the compound labour. Thus the masons and carpenters who build a house, or railway station, or a bridge, perform but a small fraction of the whole work expended on the undertaking. To prepare and bring to the locality the materials—as stone, bricks, lime, iron, wood — there had been employed numerous quarriers, brickmakers, woodcutters, carters, with the use of roads, railways, and possibly of ships, and with the co-operation of expensively-educated miners, mariners, contractors, builders, &c., directing the less educated workmen, and with the stores of necessaries or money expended during the progress of the work. If the operative masons and carpenters, then, receive the rate of wages for their labour which the market decides as just, according to the supply and demand, as explained in § 40, they are justly and sufficiently paid.

Let it now be supposed that a certain number of the operative fishermen of a town on the coast had formed themselves into a club or union, and, conspiring together, were to say to the master fishermen, or owners of the nets, "We demand from you so much a day more wages, or we shall strike—that is, shall cease working your nets—and shall use means to prevent any other fishermen from working in our stead, so that, if you refuse our demand, your nets will remain unused and may fall into decay." Such a proceeding in most civilized countries would be immediately punished as an outrageously dishonest conspiracy. If there were as yet no law to interfere in such a case, and the evil continued, the consequences would quickly prove injurious to all parties in the five following ways :—

(1) to the owners or proprietors, whose fair return for the use of their property would be withheld or diminished; (2) to the public, who would not receive the usual supply of one part of their food, or would have to pay dearer for what they got; (3) to the other fishermen not of the club, who would be prevented by threats or otherwise from accepting gainful service offered to them; (4) to youths, who had intended to engage in the calling, as a means of gaining their livelihood; (5) and lastly, to the union-men themselves, because eventually, even if the masters yielded, cheaper supplies of what had become dearer would reach the market from other quarters, and their too highly paid services would not be required. In fact, however, the evil in any such case would probably soon be cured by the arrival of fresh workmen from other quarters, who, protected by law, would overcome or break down the attempted monopoly.

What is here supposed of unwise conduct on the part of operative fishermen is almost exactly what is now the conduct of the clubs of masons, carpenters, and others of the building trade who in London have struck work to compel the master builders or contractors to give higher wages, or to shorten the hours of work.

The natural adjustment of the rate of wages and hours of work, and of the profits from capital, as parts of the economy of a civilized community, is effected by the relation in the open market of supply and demand, as explained here in § 40 and § 42. It may be here remarked that the employers or owners of capital, in most cases, are men who had been workers themselves in early life, and who by superior skill, industry, and honesty, with economy, had accumulated some wealth and converted it into the implements and necessaries of their trade; so that workmen who disturb the natural course of industry are thereby damaging the prospects of the most deserving of their own fraternity.

To regard as an idle and useless member of society a capitalist who may not now be working with his hands, but whose mental ingenuity in past time, or that of his parents, had devised mechanical or other improvements in the machinery of civilization, by which the labour of one man is enabled to effect as much as that of twenty did before such improvement was introduced—to deem such a man and his family useless parts of a community is an error in reasoning scarcely to be surpassed.

Note 118—*to* § 50 B.

The fallacy or ignorant belief that the present operatives are doing all the work of society has been the starting-point of many other fallacies. Such was the maxim adopted in the wildness of the French Revolution, that there should be *liberté, egalité, fraternité*—liberty, equality, and brotherhood—which equality meant that every person born had a right to an equal share of the cultivated land and all other property in the country; and therefore that the son of an idle, dishonest drunkard, who had perhaps impoverished his relatives, trying to uphold or support him, had a right to an equal share of the accumulation of property made for their families by the skilful, industrious, frugal, and upright members of the society.

Note 118—*to* § 50 C.

Another prejudice among the uneducated has been that to give any part of the land of a country in full property to any individuals is an injustice done to those who get none; for that the land belongs to the people as a whole, and that, therefore, the nominal proprietor of a landed estate is a robber or tyrant. In reply to this, it has to be considered that land produces its corn or other food only after it is cultivated—that is to say, cleared of stones and weeds, and ploughed, and harrowed, and sown with good seed, and fenced or guarded, &c. Now, land so prepared differs as much from a portion of a wilderness as a tree cut down and formed into beams and planks, or machinery and furniture, differs from a tree growing in a free wood. Nobody questions the right to the produce of his labour of a man who cuts down trees which belonged to nobody and forms them into a house and furniture. Then it is evident that if public authority did not give to a man who cultivates and sows a field to produce corn in a community, a clear right to the field and its produce, no land would ever be cultivated, and no food would be regularly grown, and there would be no harvest, no corn, no bread, and therefore no civilized people. The inhabitants of that country would continue to be savages, depending on the produce of the chase from day to day, or on their finding wild fruit or roots, like the bears or foxes who live in the wood with them.

Note 119—to § 35.

It has been said, on the other side, that the spirit and the flesh—the mind and the body—are not entirely antagonistic; for that while the latter, in its ignorance of consequences, might soon destroy itself by excessive sensual gratifications and otherwise, the former, as a friend, takes care of it, and by guarding it from many dangers, and persuading it to do what is best for it, prolongs its life in healthy enjoyment.

Note 120—*to* § 72.

In the Report just published of the Royal Commissioners on Education, evidence is given of defects painful to contemplate, in the present state of education among the lower classes in England, a considerable part being due to the imperfection of the English alphabet. The evidence "shows," say the Commissioners, "that the mass of the children get little more than a trick of mechanically pronouncing the letters, and that the words which they read convey hardly any ideas to the mind." (See Abstract of the Report, by H. Skeats, pages 49–51.) Specific illustrations are given. "Mr. Brookfield asked two questions from the Church Catechism: 'What is thy duty towards God?' and 'What is thy duty towards thy neighbour?' The following were the replies, written on slates, by two children of average intelligence of eleven years of age :—

> "'My duty toads God is to bleef in him, to fering and to loaf withold your arts, withold my mine, withold my sold, and with my sernth, to whichp and to give thinks. to put my old trast in him, to call upon him, to onner his old name and his world, and to save him truly all the days of my life's end."
>
> "'My dooty tords my nabers, to love him as thyself, and to do to all men as I wed thou shall do and to me, to love, onner, and suke my farther and mother, to onner and to bay the Queen, and all that are pet in a forty under her, to smit myself to all my gooness, teaches, sportial pastures and marsters, to oughten myself lordly and every to all my betters, to hut no body by would nor deed, to be trew in jest in all my deelins, to beer no malis nor ated in your arts, to kep my ands from pecken and steel, my turn from evil speaking, lawing and slanders, not to civet nor desar othermans good, but to lern laber trewly to git my own leaving, and to do my dooty in that state if life and to each it is please God to call men.'"

The evidence given proves that it is a delusion to think that the children generally learn to read in a degree to be useful to them in after life, and the delusion regards also the religious instruction.

To be able to read, write, and cipher passably well, is to have the key to every other part of human knowledge; and this key the Report of the Commissioners asserts is not given to above a fourth part of the children whose names have appeared in the school lists. Besides this defective teaching of the elementary subjects in the schools now receiving Government assistance, there are various other things which demand change, and to which the intelligence of the country, awakened by the present elaborate and instructive Report, will be directed.

Note 121—*to* § 90.

Dr. Franklin's counsel:—

"The way to make money plenty in every man's pocket. Two simple rules, well observed, will do the business.

"First, let honesty and industry be thy constant companions; and,

"Second, spend one penny less daily than thy clear gains.

"Then shall thy hide-bound pocket soon begin to thrive, and shall never again cry with empty belly-ache; neither will creditors insult thee, nor want oppress, nor hunger bite, nor nakedness freeze thee. The whole hemisphere will shine brighter, and pleasure spring up in every corner of thy heart. Now, therefore, embrace these rules and be happy. Banish the bleak winds of sorrow from thy mind, and live independent. Then shalt thou be a man, and not hide thy face at the approach of the rich, nor suffer the pain of feeling little when the sons of fortune walk at thy right hand; for independency, whether with little or much, is good fortune, and placeth thee on even ground with the proudest of the golden fleece. Oh, then, be wise, and let industry walk with thee in the morning, and attend thee until thou reach the evening hour for rest! Let honesty be as the breath of thy soul, and never forget to have a penny, when all thy expenses are enumerated and paid; then shalt thou reach the point of happiness, independence shall be thy shield and buckler, thy helmet and crown; then shall thy soul walk upright, nor stoop to the silken wretch because he hath riches, nor pocket an abuse because the hand that offers it wears a ring set with diamonds!"

Note 122—*to* § 90.

Social Economy is one of many names which have been given to the same department of knowledge. Others are, Political Economy, Economic Science, Art of Civilization,

&c. This multiplicity with vagueness of the names, drawn from the Greek and Latin languages, has produced confusion in the popular conception as to what really is meant, and has turned away many minds from the study. The Latin word 'Socius' signifies a companion, whether good or bad, and society is companionship, and social is whatever belongs to society. But in popular use social often means jovial, merry, gay, as applied to companions. Then economy, which implies simply the mode of managing a family, from the Greek *oikos*, 'a house,' and *nomos*, 'law,' and is used also in the phrase economy of a bee-hive, or of an ant's nest, has come in popular language to mean a saving or reducing of expense; and social economy, which really means the art of securing to the great human family abundance of all that contributes to its well-being, has awakened ideas very wide from those intended.

Note 123—*to* § 71 *and* § 105.

Specimen of a Glossary of words taken from the Greek and Latin languages:—

GREEK.

Glossary	from	*Glossa*, the tongue.
Astronomy	,,	*Aster*, star, and *Nomos*, law.
Geography	,,	*Ge*, the earth, *grapho*, to write.
Geology	,,	*Ge*, and *Logos*, a discourse.
Theology	,,	*Theos*, God, and *Logos*.
Zoology	,,	*Zoos*, living, and *Logos*.
Physiology	,,	*Physis*, nature, and *Logos*.
Psychology	,,	*Psyche*, the soul, and *Logos*.
Mathematics	,,	*Mathema*, learning.
Monopoly	,,	*Monos*, alone, and *poleo*, to sell.
Phenomenon	,,	*Phaino*, to show (appearance).
Philosophy	,,	*Philos*, lover of, *Sophia*, wisdom.
Biology	,,	*Bios*, life.
Politics	,,	*Polis*, a city.
Hygiène	,,	*Hygeia*, Goddess of Health.
Syntax	,,	*Sun*, together, *tasso*, to arrange.
Telescope	,,	*Tele*, far, and *scopeo*, to see.
Microscope	,,	*Mikros*, small, and *scopeo*.

LATIN.

Curriculum	from	*Curro*, to run—a course.
Civilization	,,	*Civis*, a citizen.
Fallacy	,,	*Fallo*, to deceive.
Induction	,,	*Duco*, to lead—in.
Morals	,,	*Mos*, mores, manners.
Religion	,,	*Re*, again, and *ligo*, to bind.
University	,,	*Unus*, one, *verto*, to turn—the whole, or totality.
Science	,,	*Scire*, to know.
Social	,,	*Socius*, a companion.
Society	,,	
Chart	,,	*Carta*, paper.
Table	,,	*Tabula*, a plank.

Note 124—*to* § 73 B.

The books of a library may be usefully arranged in different ways to answer particular purposes, as (1) according to the different languages, or (2) according to the subjects—history, poetry, science, travels, &c.—or (3) according to the size of the volumes, folio, quarto, octavo, and so may any other assemblage of things, or any complex subject, be dealt with for special ends. Thus the subject of education may be viewed according to the common division into physical, intellectual, and moral education, or with more complete analysis, in the sixfold division adopted in this book (§ 51); and the subject is not completely possessed by any mind which has not considered it under different aspects. It was in contemplating the human being, physiologically, during the *Healthy* progress (§ 77) from infancy upward, in the growth of the body and development of the mind, that about fifty years ago the establishment and peculiar management of infant schools were devised, which have been so admirable in their results. It was seen that the mind of the child should be fixed on any one subject only for a short time, and that a pleasing variety and order of subjects should be adopted, so that the child should seem to itself to be engaged rather in varied play, made up of study, amusement, and exercise, than, as is the fact, in very important work. And it is now likely to be found, that by adopting proceedings of a somewhat similar kind for more advanced children or young people, similar advantages will follow—when, instead of keeping them imprisoned and sedentary for long hours in close unhealthy school-rooms as is now common, there shall be shorter times of work and fresher and more vigorous minds, with intervals of relaxation and of suitable bodily exercise; and when in consequence, (as Milton said was possible with respect to the acquisition of Greek and Latin—see note to page 166,) with less than half the time now devoted to book learning, more than twice the knowledge shall be acquired; and when, further, there will grow up stronger and more healthy men and women. The children of the working classes—by far the most numerous in any community—may in certain cases, while other instruction is going on, be accustomed to beginnings of light industry of the kinds likely to occupy their future lives.

Note 125—*to* § 49.

The fact clearly ascertained that no country on earth is now possessed by the people or race which originally or in remote time held it, but by another which in war drove out the former, slaughtering many, and often using as slaves those who were spared, tells an important part of the history of humanity. Man, although possessing mental faculties susceptible of marvellous cultivation, is born into the world utterly ignorant, and with the mere animal instincts and narrow selfishness which deem *might* to be *right*. Hence in the savage state, individuals and tribes have always been fighting like wild beasts, and often as cannibals, devouring the prisoners taken. In small communities, however, the members would soon discover the enormous advantage to all of practising among themselves honesty and mutual kindness, and larger civilized communities, thriving by such practice, grew up apace. But, strangely, these so far civilized communities behaved towards one another, not with justice and friendship, as became civilized individuals, but were as selfish and cruel as wild beasts or single small tribes of savages. The whole past history of mankind is thus chiefly a record of fierce contentions or wars between nations, all acting as if might were right, and it explains the fact of countries so frequently changing masters. The ancient history of England sketched in § 114 strikingly exemplifies this, and there is similar history of almost every other country; the great object and ambition of each having been to extend dominion over others. But a change is now coming over the world. England within a century,—namely, since the breaking loose from her of her American colonies—seems to have become the first nation to see clearly, and to act on the discovery, that justice and friendly relations between countries are as useful as the same virtues are between the individuals of a single nation; and now, instead of striving to retain absolute dominion over her vast colonies, she is training them to be able to govern themselves, by aiding them to establish their own parliaments, and to make laws like those under which she has herself prospered, and she desires to retain towards them only the friendly relations of a parent towards prospering offspring who must soon surpass herself in numbers and power. And she still further desires to see all other nations governing themselves by free representative institutions, so that every nation on earth, through peace and free trade protected by a law of nations, shall contribute to the well-being of every other.

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